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XXXII No. 1
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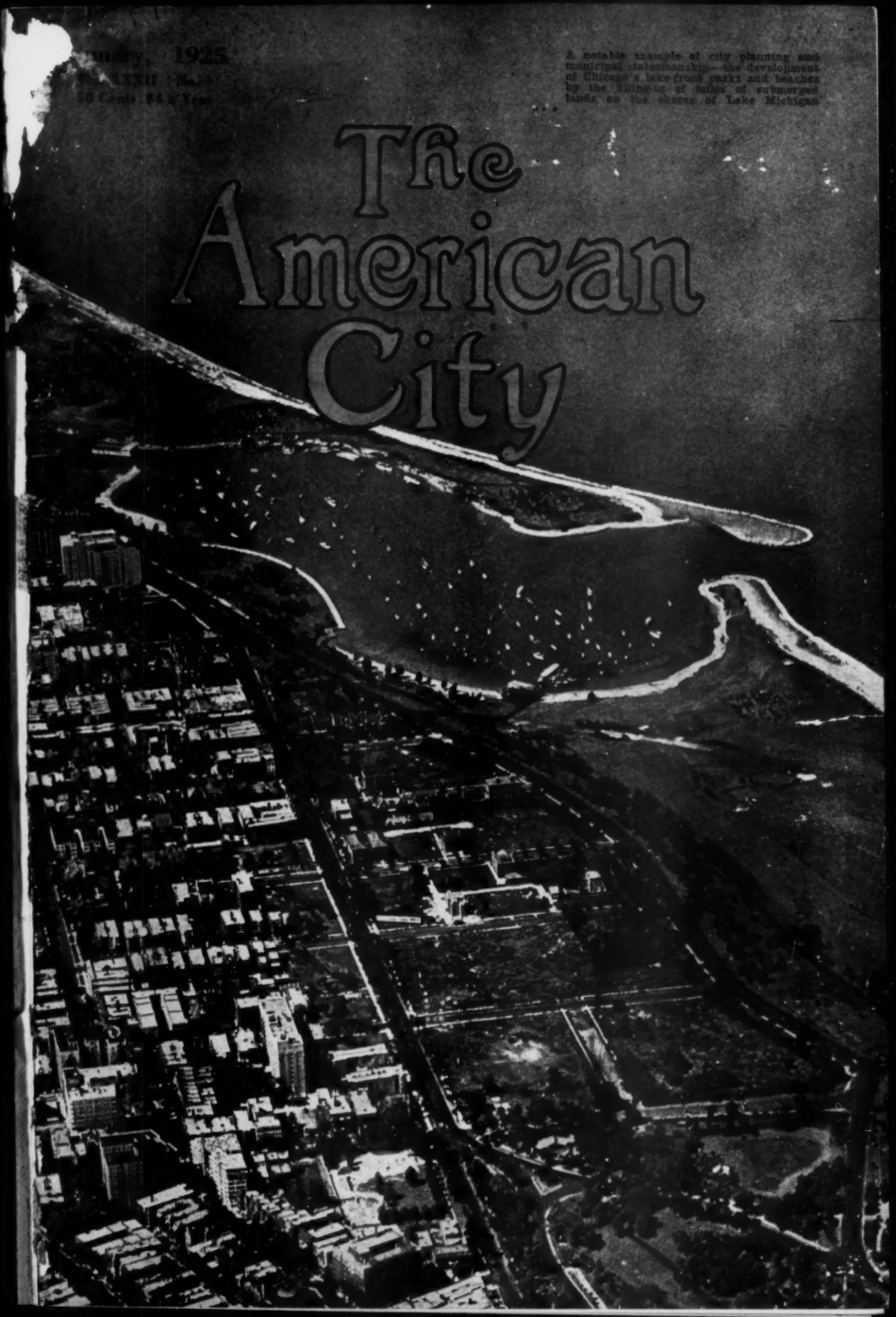
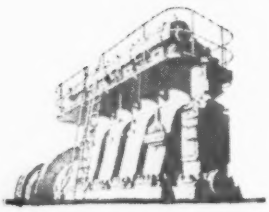
The American City



Savings in Labor Dollars



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The offices of THE AMERICAN CITY, 443 Fourth Avenue, N. Y., are headquarters for the free distribution of information on equipment for municipal work. If you want catalogs, prices or names of manufacturers, let us help you.

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Vol. XXXII.
No. 1

The American City Magazine

JANUARY
1925

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Result of a Limited Experience with Black Base Construction

By Harry F. Harris
Engineer for Mercer County, New Jersey

AS the highway paving program continues to expand year after year, it becomes more and more apparent that there is no single phase of the work which is more exasperating, both to the contractor and to those in responsible charge of the engineering, than the problem of providing for traffic during construction; and as the number of motor vehicles increases, the demand for rapid completion of highway construction becomes greater.

There is perhaps nothing which "riles" a tourist more than to be traveling from one point to another on a designated route and be suddenly confronted with a glaring sign denoting that a road is closed and that a detour, usually of questionable character, must be followed. Again, constant users of a given route lose valuable time by prolonged delays in completing road work, to say nothing of the wear and tear on both tires and machine and the extra consumption of fuel caused by the extra mileage traveled on miserable detours. The economic loss from this cause alone is one of considerable proportions; therefore, studies looking to the use of materials and methods by which the period of construction can be shortened materially are of prime importance.

The situation becomes particularly acute as large cities are approached on trunk-line highways, and not only does the user of the highway have his troubles, but the road superintendents, inspectors, engineers and others charged with the rebuilding of our highways are continually battling with those who insist on passing over new work, regardless of barricades and detours. It is therefore incumbent upon the engineers, in particular, to be sure, in

SCENE ON CLINTON AVENUE, MERCER COUNTY, N. J., A 1½-INCH SHEET ASPHALT PAVEMENT OF STONE AND BLACK BASE FOUNDATION CONSTRUCTED IN 1923
A 16-hour traffic census on this road showed 25 motor-cycles, 41 horse-drawn vehicles, 1,791 pleasure cars and 462 commercial motors, totaling 2,319

designing and planning for new roads, not only that the grades, curves, alignment, drainage, etc., are in accord with the best modern practice, but that the loss of time on account of the road's being out of service during construction, is carefully considered.

Black Base Reduces Construction Time

That this very troublesome problem can be materially helped by the use of the so-called black base construction, has been well demonstrated to the writer. Three years ago he was confronted with the problem of providing a pavement for a comparatively short length of unimproved road passing a large industrial plant which was so situated that it was impossible to detour the traffic to and from the plant. The plant manufacturers had to ship each day from their plant a considerable amount of their product, which had to be hauled by drays from the plant to the nearest freight station, the plant not being provided with a railroad siding. The freight station was within less than one-half mile from the plant, but all the product which was to be shipped by rail had to pass out over the street in question.

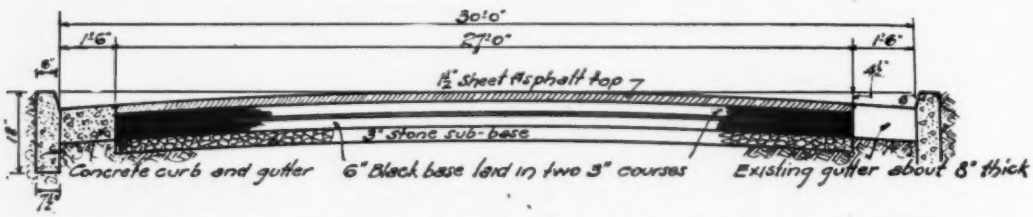
The ordinary procedure would have been to construct a 6- or 8-inch portland cement concrete foundation and proceed to pave the surface with sheet asphalt, bituminous concrete or vitrified brick. In this case, however, had such procedure been followed, it would undoubtedly have meant either tying up the manufacturer's plant for several weeks while the concrete was curing, or constructing the pavement one-half at a time, which is always objectionable, greatly increases the cost, and has the further disadvantage of prolonging the time during which the road must be under construction. This not only interferes with the contractor's work schedule, but causes confusion and delay for the road users.

After giving the problem some study and considering the wide-spread use of black base construction in our extreme West, it was concluded that it would be well worth while to give it a trial. The net result was that the work was completed in record time, the cost was 11 per cent below the engineer's estimate, and all traffic was suspended for a maximum time of only four hours during construction, which meant much to the plant owners.

The total cost of the work, including excavation, stone subfoundation, 6-inch black base foundation, and 1½-inch sheet asphalt surface, totaled $4.05 per square yard. This cost was distributed as follows:

Excavation, per square yard	$0.49
3-inch stone subfoundation, per square yard	0.18
6-inch black base, per square yard	2.49
1½-inch sheet asphalt surface, per square yard	0.89
Total	$4.05

This job, after three seasons of wear, is in perfect condition, and compares very favorably with the sheet asphalt pavements laid on concrete base with which it joins at each end, although the pavement laid on the rigid base shows transverse cracks at quite regular intervals, undoubtedly due to temperature fractures in the base which have been transmitted to the top.



TYPICAL CROSS-SECTION OF BLACK BASE WORK IN MERCER COUNTY WITH LIGHT STONE SUBBASE AND HEAVIER BLACK BASE SURFACED WITH 1½-INCH SHEET ASPHALT, AS USED IN CONSTRUCTING EAST CLINTON AVENUE

So good were the results of this first experiment, that the following season a somewhat larger and more extensive job was planned. The time-saving possibilities for this type of construction were brought out to excellent advantage. The road is approximately 2 miles in length, and was built 20 feet in width, with 3 feet of penetration macadam shoulders on either side. It is so situated that much of the heavy trucking between the cities of New York and Philadelphia passes over it.

In addition to selecting black base construction for speeding up the completion of the work, a further incentive to getting the road reopened at the earliest possible moment was employed, that is, a bonus and penalty clause was inserted in the contract. The time allowed for completion of the work was 121 days, in-

SANHICAN DRIVE, MERCER COUNTY, N. J., BUILT OF BLACK BASE CONSTRUCTION IN 1924
A 16-hour traffic census on this road showed 30 motor-cycles, 10 horse-drawn vehicles, 3,284 pleasure cars, and 320 commercial cars, totaling 3,644. The maximum number of vehicles recorded in any day was 5,306

cluding Sundays. Much to our surprise, the entire contract, including some extensive drainage work, was fully completed and ready for acceptance in 71 days and the contractor was thus enabled to earn a bonus of $500 for the 50 days' time saved, which the county gladly paid because it was felt to be worth all of this sum to the taxpayers to have had the full use of the road for this unexpected period.

This work differed from that of the previous year, in that a much heavier stone subbase was used in widening the old stone foundation, and a lesser depth of black base was required. As a uniform depth of black base was not practicable, bids were received for a price per ton in place for the bituminous concrete foundation or black base.

In some places 8 or 9 feet of widening was required because of the poor original location and alignment of the old road. The old road had been constructed of macadam to which a bituminous surface treatment had been added for five or six years in succession. This had to be removed, leaving many irregularities in the surface which had to be built up with bituminous concrete varying from 2 inches to 4 inches, while that on the outside of the old road was laid approximately 6 inches thick in two layers each 3 inches.

The engineer's cost estimate was $104,740 for the entire job, including drainage and other incidental work, while the low bid was $102,309, which was accepted. Unit prices were taken on each of the fourteen different items of construction, the per ton price for black base being $8.90 and for 1½-inch asphalt top surface $1.49 per square yard.

Two additional stretches of road were reconstructed during the current year with black base, at each of which locations it was important that traffic should be suspended a minimum length of time. On one job which carried a large volume of evening pleasure traffic, it was possible thereby to open the roadway each evening from 7:30 P. M. until 7:30 A. M. the following morning, during the time the pavement and base were being laid, which covered a period of about two weeks for ½-mile of roadway 24 feet wide. A recent traffic census shows that this road carries an average of close to 5,000 vehicles per day of 16 hours, 90 per cent of which were pleasure motor cars.

The other contract was for paving a road in an industrial district immediately adjoining the city of Trenton. No traffic figures are available for this particular road.

Details of Construction

As in all other types of construction, it is essential that drainage shall be properly and adequately provided, both for surface and subsurface conditions. Bituminous pavements, above all others, are particularly susceptible to deterioration through the action of mois-

ture, and they must be protected from it to the utmost.

What is true of moisture can be emphasized also in regard to foundation. Be sure of your subfoundation. Whether a subfoundation will be required for the black base will depend entirely on the conditions peculiar to each job and the locality. On all of the writer's work, so far, use has been made of some form of subbase—not always for the same reasons, however.

In the original work we had a very sandy soil, which was hard to roll and compact to obtain the proper cross-section. The entire width of road was excavated for a 3-inch subbase course; the old stone from the center of the road was spread, sprinkled and rolled into the sandy soil, and a fairly good subbase was thus obtained. On the other jobs a regular stone road had previously been built, part of which was usually retained. Roadways from 20 to 24 feet wide were built and, where it was required to widen out the shoulders, the extra depth for subfoundation was made up by utilizing stone scarified from the center of the old road.

In general, it would seem to be good policy not to omit the subbase unless the climatic conditions, as well as the character of the soil, are favorable.

After having considered and provided properly for drainage and subfoundation where these may be required, the next step is to lay the bituminous foundation. This usually is laid and prepared as is the ordinary asphalt binder course, except that perhaps a mixture carrying about 25 per cent of sand makes a denser and more desirable mix when added to the binder stone, in which the particles passing the ¾-inch and 1-inch mesh sieves, predominate.

As a rule, this mixture is laid 6 inches thick. It is spread and rolled in layers so that each layer shall not exceed 3 inches in total thickness after compaction. After this has been done, a regular standard sheet asphalt top 1½ inch in thickness is applied in the usual manner.

A typical analysis of the black base used in connection with the local work follows:

		Per Cent
Bitumen		6.0
Passing—		
200 mesh		2.7
100 mesh	4.2	
80 mesh	2.2	
50 mesh	4.9	
40 mesh	3.2	
30 mesh	2.6	
20 mesh	3.6	
10 mesh	4.0	
¼-inch	2.4	
		27.1
Passing—		
½-inch mesh	7.4	
¾-inch mesh	27.6	
1 -inch mesh	23.4	
1¼-inch mesh	5.8	
		64.2
		100.0

Through a limited experience with this form of construction, the writer believes that its use will continue to grow as its advantages become more and more apparent. He also believes that it is far from a panacea or a cure-all for our road ills, as it has its limitations, particularly for city pavements, which have been honeycombed with openings for all kinds of mains and service connections; but where a first-class rural pavement is required to be built in a minimum of time, grades and other conditions permitting, this type of pavement seems to fill the requirements in a most acceptable manner.

ACKNOWLEDGMENT.—From a paper read before the American Society for Municipal Improvements at Boston.

Association of American Municipal Organizations Formed

TO promote the exchange of methods, experience and accomplishments of state municipal organizations, the secretaries of ten leagues of municipalities, at a meeting held at the headquarters of the Kansas League on December 12 and 13 last, organized the Association of American Municipal Organizations.

The principal service rendered by the member organizations will come through the mimeographing each month of a news bulletin. Each secretary will furnish the national organization with a report of his league's accomplishments and any plans for new or extended services. These reports will form the principal data for publication in the monthly bulletin.

Each league will also send to the national headquarters duplicate copies of all its publications, circulars, etc., for review in the bulletin. This material may be borrowed from the national headquarters by any member secretary. It is also a part of the organization scheme that each member organization shall exchange its major publications with other members.

The headquarters of the League of Kansas Municipalities, at the University of Kansas, Lawrence, Kans., has been selected as the secretariat of the organization, and the following officers have been elected: President, Morris B. Lambie, Executive Secretary of the Minnesota League of Municipalities, Minneapolis, Minn.; Vice-President, Morton L. Wallerstein, Secretary of the Virginia League of Municipalities, Richmond, Va.; Executive Secretary, John G. Stutz, Executive Secretary, League of Kansas Municipalities.

A resolution was passed by the secretaries present to invite all the state municipal organizations not represented to become members of the new national organization.

Cutting Catch-Basin Cleaning Costs in Rockford, Illinois

By B. C. Harvey
City Engineer, Rockford, Illinois

IN order to expedite the work of catch-basin cleaning and to reduce costs, the city of Rockford purchased an Auto-Eductor, which was delivered June 30, 1924, and was placed in service the next day. During the month of July, the machine operated 25 days, or 177 hours, using 323 gallons of gas and 112 pints of oil and grease. In this time 254 catch-basins were cleaned, from which 312 cubic yards of refuse was removed and hauled to the dump, the average haul to the dump being 3 miles.

In figuring costs, a depreciation of $8 per day, including interest, is charged against the eductor each day it operates. The depreciation is figured as follows: The life of the eductor is taken as 6 years, or about 1,300 working days. The cost, $8,825, divided by 1,300 gives a cost of $6.78 per day. The following table shows how the interest charge is figured:

Interest at 5% for first year on original cost, $8,825	$441.25
Interest at 5% for first year on first-year depreciation, or $7,354	367.70
Interest at 5% for second year on second-year depreciation, or $5,883	294.15
Interest at 5% for third year on third-year depreciation, or $4,412	220.60
Interest at 5% for fourth year on fourth-year depreciation, or $2,914	147.05
Interest at 5% for fifth year on fifth-year depreciation, or $1,470	73.50
	$1,544.25

The total interest, $1,544.25, divided by 1,300 is $1.18, making depreciation and interest approximately $8 per day. The average cost of cleaning each catch-basin during the month of July was $2.26, and the average cost per cubic yard of refuse removed was $1.84.

During the month of August the eductor operated 25 days, or 176¾ hours, using 347 gallons of gas and 96 pints of oil and grease. During this month 279 catch-basins were

AUTO-EDUCTOR MOUNTED ON GMC TRUCK, USED BY SEWER DEPARTMENT OF ROCKFORD, ILL., FOR CLEANING CATCH-BASINS

Weather Fair — Bureau of Sewers City of Rockford — Date Sept. 12, 1924

Temp. at noon F° — Daily Report Sheet for Cleaning of Catch Basins — Driver number

Work Done — Cost of Work

	Location of Catch Basins	Time of Beginning 8.00	Dirt Removed Depth	Dirt Removed Cu. Yds.	Loads Hauled	Location of Dump
1	National & Douglas	8.30	2	1		Douglas
2	Hancock & Harlem Blvd.	9.00	2	1		"
3	Cumberland & " "	9.30	2	1		"
4	Clinton & Ellis	10.00	2	1		"
5	" & Cottage Grove	10.30	2	1		"
6	" & Harper	11.00	2	1		"
7	Oxford & Van Die	11.30	2	1		"
8	Oxford & Van Die	12.00	2	1		"
9	" & Harper	1.00	2	1		"
10	" & Ellis	1.30	2	1		"
11	Cumberland & Auburn	2.00	2	1		"
12	Melrose 1824	2.30	2	1		"
13	Melrose & Ellis	3.00	2	1		"
14	Melrose & Auburn	3.30	2	1		"
15	Douglas & Ellis	4.00	2	1		"
16	Douglas & Auburn	4.30	2	1		"
17						
18						
19						
20						
21						
22						
23						
24						
25						
	Totals					

	Title	Name	Rate	Hours Worked From	Hours Worked To	Hours Worked Total	Cost	Total Costs
Wages	District Foreman							
	Asst Dist. Foreman							
	Eductor Foreman							
	Driver	Geo. Bolin	.85	8	4.30	8	6.80	
	Laborer	Wm. Lang	.55	8	4.30	8	4.40	
	Laborer	T. King	.55	8	4.30	8	4.40	
	Total Cost— Salaries and Wages							15.60
Supplies	Gasoline 16 gal.	Gallons @ $ 13.4¢					2.41	
	Oil 1 qt.	Gallons @ 12¢					.12	
	Grease	Pounds @						
	Total Cost of Supplies							2.53
Maintenance	Total Cost of Maintenance							
Fixed Charges	Depreciation	sales @ $ per mile					10.00	
	Total Cost of Fixed Charges							0.00
	Total Cost of Auto Eductor for the day							2.53
	Total Cost for Salaries and Wages for the day							14.00
	Total Costs for the day							24.53
	Number of Catch Basins Cleaned	16	Unit Cost per Catch Basin					1.53

Mileage for Eductor

Meter Readings: At beginning of day 1309.7; At noon 1315.0; At close of Day 1320.3

Miles Run: During A. M. 5.3; During P. M. 5.3; Total for day 10.6

Remarks

Signed J.E.RANK Division Foreman

TYPICAL OPERATION REPORT OF AUTO-EDUCTOR

cleaned, from which 319 cubic yards of refuse was removed and hauled to the dump. The average cost of cleaning each catch-basin for that month was $1.99, or an average cost of $1.74 per cubic yard of refuse removed.

The month of September showed a still further reduction in cost. The eductor operated 22 days, or 156 hours, using 282 gallons of gasoline and 94 pints of oil and grease. During September 293 catch-basins were cleaned, from which 315 cubic yards of refuse was removed and hauled to the dump. The average cost of cleaning each catch-basin was $1.78, or $1.66 per cubic yard of material removed.

The eductor has also been used for cleaning out cellars which were filled from stopped sewers, resulting in a sanitary method of removing sewage. It has also been used to pump out sewage when lowering a manhole in the sanitary sewer system.

Inasmuch as it takes several months for the operators and helpers to become used to the equipment, its operation and the location of manholes, the city feels gratified at the results obtained, particularly as the average cost for cleaning catch-basins prior to the installation of the eductor was between $2 and $2.50.

An examination of the monthly records shows that in September it cost 48 cents less per catch-basin and 18 cents less per cubic yard than during the month of July. It will require about four months to clean every combination manhole and catch-basin in the city of Rockford. Therefore, every catch-basin will be cleaned at least twice each year, while those which are subjected to the most severe conditions will be cleaned as required.

A Landing Field for Atlanta

THE purchase of property on Brown's Mill Road for use as a municipal landing field was recently authorized by the Atlanta City Council, after weeks of site inspection and deliberation. The city is to pay half of the purchase price of $65,000, and Fulton County the remainder. The resolution adopted provides for the immediate payment of $8,125 to the owners of the property as an initial purchase price, and asks that the next three councils appropriate like amounts to complete the city's apportionment. To raise this money, Beal Park will be sold and the funds appropriated to the more useful purpose of an airplane landing field. At the present time Beal Park is entirely undeveloped and the City Park Commission is without funds to put it in shape.

The new field will be one of the best in the country. It is within three miles of the terminal station and the post office, making possible a fifteen-minute mail service between the post office, the station, and the landing field. It is expected that when the field has once been purchased and put in shape, sufficient revenue can be obtained from it to pay the other notes when they fall due. A circus will be held each year, netting several thousand dollars to the city. Concessions will be rented out for several thousand more, and as the field covers 208 acres, some of the land can undoubtedly be rented.

WHY SOME CITIES GET "SMALL FRY" MUNICIPAL EMPLOYEES By MORRIS

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Is there any business of greater importance to your city than the municipal government itself? And is there any real economy in paying inadequate salaries?

Two Illinois Cities Solve the Problem of Stream Pollution

By Gustav H. Radebaugh

Manager, Urbana and Champaign Sanitary District, Urbana, Ill.

THE cities of Champaign and Urbana have just completed a sewage treatment plant sufficient to take care of a contributing population of 50,000, and 3½ miles of intercepting sewers sufficient for a contributing population of 70,000. With the rapid increase of population in the two cities, and the ever-increasing number of students, faculty and administrative staff at the University of Illinois, the citizens of these two towns have met with progressive spirit the need for civic improvements to make these cities comfortable and healthful places in which to live. In less than fifteen years the population has approximately doubled, which means many local improvements that a growing community demands in these days of better living.

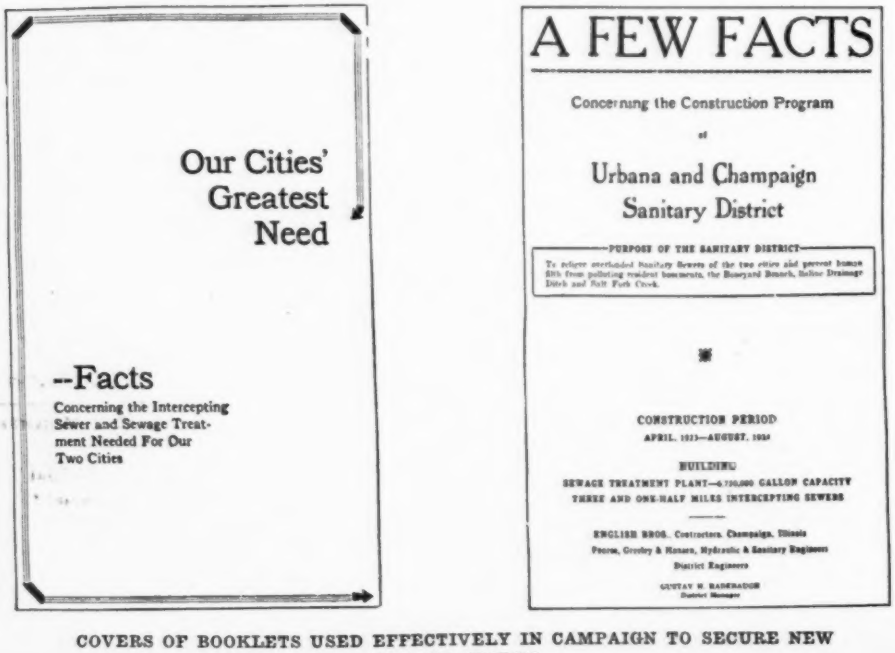
It was evident in 1916 that the sewers were not of sufficient size to take care of this rapid and unexpected growth. The septic tanks built some years previous were becoming entirely inadequate. Each city had a separate system of sewage collection and disposal.

Immediate relief from this ever increasing demand on the sewer system was necessary. To permit the old system to function at all, the last few years, it was essential to provide overflows into the main drainage channels, the Boneyard Branch, and Salt Fork Creek. In a few years an inspection of these streams revealed a conglomeration of filth and sewage and a breeding place for disease. The overflows made practically an open sewer out of the streams during many weeks of the year. A gaging in October, 1917, gave the Salt Fork a flow of only 250,000 gallons per 24 hours.

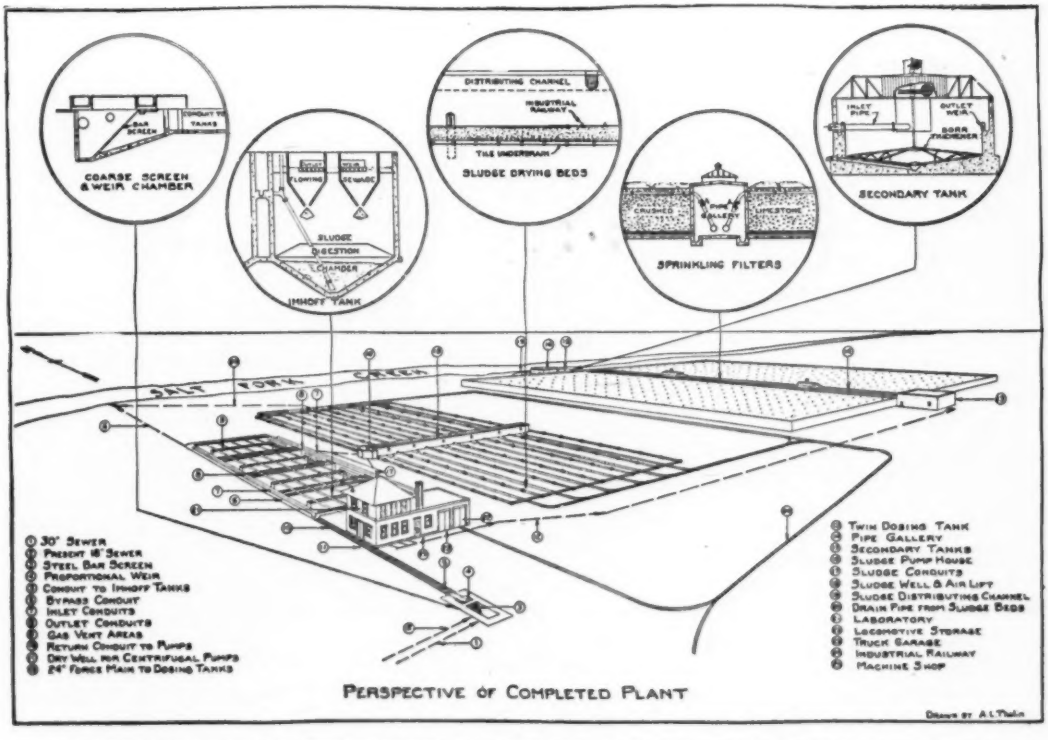
The timely interest of committees from the Chamber of Commerce of Champaign and the Association of Commerce of Urbana, the two City Councils, the Women's Clubs of the two cities, the Rod and Gun Club of Champaign County, and many other social and civic agencies brought about an election in May, 1921, and a Sanitary District was successfully voted under the state act approved in 1917.

The District

The business of the District is vested in



COVERS OF BOOKLETS USED EFFECTIVELY IN CAMPAIGN TO SECURE NEW SEWAGE WORKS



A REPRODUCTION OF PERSPECTIVE OF COMPLETED PLANT FROM PUBLICITY BOOKLET

three trustees. Within a few weeks after the District was formed, the trustees engaged consulting engineers to make a survey and recommend what should be done to relieve the polluted condition of the stream. After their report was received, a pamphlet, "Our Cities' Greatest Need," was published by the trustees of the District giving to the citizens facts about this much-needed improvement. This pamphlet was mailed to the citizenship, as shown on a public utility matling list.

The purpose of the District was definitely stated in this pamphlet:

1. Eliminate the polluted condition of the Boneyard Branch.
2. Relieve the present overload on all our main sewers.
3. Eliminate human filth from backing up in Green, Clark and Washington Streets, Illinois Central Subway.
4. Stop the sewage from overflowing manholes on West Green Street, Urbana, and East Green Street, Champaign.
5. Fulfill a promise made by the citizens of the Twin Cities to farmers living east on the Salt Fork Creek.
6. Discontinue the use of the several overflow sewers that empty direct into the Boneyard.
7. Meet the demand made by the State Board of Health to remove the sewage from the Boneyard and Salt Fork.
8. Minimize the possibility of typhoid or other epidemics caused by the polluted condition of our watercourses.
9. Stop forever the always possible attack from outsiders on the possibility of frequent outbreaks of epidemics caused by the present condition of our watercourses.
10. Provide main sewers large enough for every taxpayer to receive effective and correct sanitary sewer service.
11. Guarantee to the Legislature and people of the state at large that the two cities have provided for proper sewage control and have met the requirements of the State Board of Health.
12. Restore the water of Salt Fork to its original condition, which is required by law. This will make it possible to restock the stream with fish.
13. Provide adequate sewers for a population of 70,000.
14. Assure every mother and father of the state who sends a son or daughter to the University of Illinois that our cities give to them the benefit of the best that can be found in every branch of municipal engineering and government.
15. Permit the farmers along Saline Branch to use the water for general purposes, to which they are justly entitled, and to water cattle in the stream, and still feel safe in the use of their milk supply.
16. Eliminate the nauseating condition of the Boneyard and Salt Fork, so noticeable in summer.
17. Prevent human filth from backing up in the basements of residences during the rainy periods.

It was this mission of community service

and protection that caused the people to vote a $500,000 bond issue in November, 1922, at a ratio of 3 to 1.

The assessed valuation of the District is $11,500,000. The works completed will represent an expenditure of about $600,000. The cost of the bond issue is spread over a period of 20 years. To meet the interest and pay the principal on the bonds, a yearly tax is levied, not to exceed one-third of one per cent. It has been estimated that the average cost to each residence property in the district will be less than $5 per year to cover the construction cost of the intercepting sewers and sewage treatment plant.

The area of the district is 5,456 acres, with an approximate population of 40,000, and with an average density of population of 6.4 per acre.

A Population Forecast

It is the opinion of many engineers that city administrative agencies should become more acquainted with population demands of the future. Cities too often expend large sums of money on improvement without analyzing the possible demand placed on this improvement in the future.

A study of future population for a city involves a careful survey of those influences that affect the growth of a community—transportation facilities, characteristics of adjoining territory, facilities of water-supply and drainage, industrial and educational activities. The forecast for Urbana and Champaign predicts that in 1930 the population, including that of the University of Illinois, will be close to 45,500; in 1940, 53,300; and in 1960, 66,000. All works were designed on the basis of this forecast. Works easily extended are planned for the tributary population expected ten to fifteen years after the works are built—50,000. Less easily extended works are built to serve an estimated population 36 years ahead—70,000.

Sewage Treatment

The process of sewage treatment used at Urbana and Champaign consists of coarse screens, primary settling tanks, sludge drying beds, and sprinkling filters. The plant is located north and east of Urbana, adjacent to Salt Fork Creek. This location is 697 feet above sea-level, the upper end of the intercepting sewer being 755 feet above sea-level, giving the sewer a fall of 58 feet from its upper end to the plant. The effluent of the plant will flow into Salt Fork Creek, which has a natural stream flow of about 3,000,000 gallons per 24 hours.

There will be four Imhoff primary settling tanks with twelve compartments having overall dimensions of 137 feet long, 95 feet wide, and 33 feet deep. Adjacent to these tanks will be located the sludge drying beds with an area of ¾-acre. The heavier solids in the sewage when passing through the two-story tanks, settle out and collect in the lower story. Here the coarser solids are attacked by certain bacteria which transform them into a black odorless humus, which is removed to the sludge drying beds, where it is left to dry. It is later removed and used as fertilizer.

The sprinkling filters have an area of 1.6 acres and an average depth of filter stone of 10 feet; 25 railway cars of cement, 6 cars of reinforcing steel, 9 cars of pipes and valves, 650 cars, or approximately 17 trains, of filter stone are a few of the material quantities used in the construction of this unit. The settled sewage is sprayed out through nozzles like lawn sprinklers and allowed to trickle down through the filter stone.

The Intercepting Sewers

Three and one-half miles of intercepting sewers have been built to relieve the present overloaded sanitary sewers of Champaign and Urbana. A 30- and an 18-inch sewer will carry the sewage to the plant for treatment. This provides a per capita capacity of 136 to 200 gallons per 24 hours. The deepest cut for the 30-inch sewer was 20 feet. The 24- and 30-inch pipe were made from reinforced concrete. Recent tests show that this pipe is able to withstand a load of approximately 6 tons before failure. Vitrified sewer pipe were used for the smaller sizes. An inverted siphon will be constructed to carry the sewage under the Boneyard Branch, where the intercepting sewer crosses the stream:

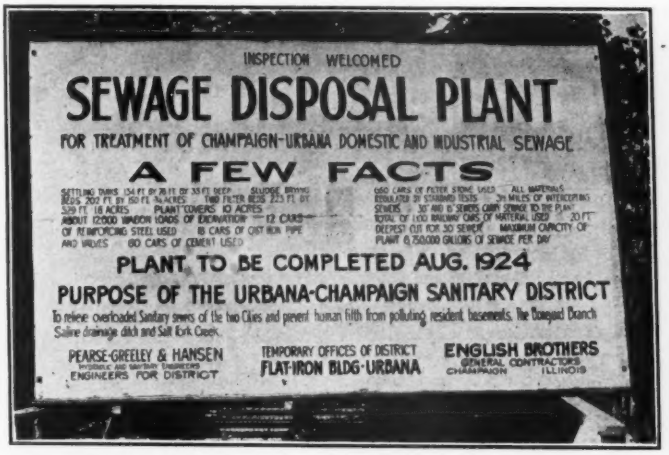
ESSENTIAL DATA OF DESIGN

	1924		1938	
	Dry Season	Wet Season	Dry Season	Wet Season
Average flow for sewage (m.g.d.)	1.37	3.37	1.96	4.82
Primary settling tanks				
Time of retention (hrs.)	4.3	1.75	3.0	1.23
Velocity of flow (ft./sec.)	.005	.012	.007	.017
Sludge storage per capita (cu. ft.)	3.3	3.3	2.3	2.3
Sludge drying beds				
Area per capita (sq. ft.)	0.95	0.95	0.67	0.67
Dosing tanks				
Time of filling (minutes)	13.7	5.5	9.5	3.9
Time of dosing (minutes)	2.4	2.4	2.4	2.4
Sprinkling filters				
Rate per acre (m.g.d.)	0.86	2.10	1.23	3.00
Average depth (ft.)	10.00	10.00	10.00	10.00

The Public Should Know

It has been one of the desires of the District Trustees to keep the people of the District well informed during the construction period as to the progress of the work. Too many times opposition comes from the public for the reason that the men carrying on the work do not take the public into their confidence and are not interested in the public's desire to learn about the work. The new order of things demands attention to public interest.

Another pamphlet was issued by the District. These pamphlets were handed to visitors and were much appreciated, as they explained in detail points of individual interest. The second pamphlet contained a cross-section illustration showing the flow line of the sewage through the plant. In this drawing titles of technical nature were held to a minimum. The pamphlet contained material on the different units of the plant, also the engineers, and the cost, and on the concluding page gave a chronological summary listing subjects of public interest.


INSPECTION WELCOMED
SEWAGE DISPOSAL PLANT
FOR TREATMENT OF CHAMPAIGN-URBANA DOMESTIC AND INDUSTRIAL SEWAGE
A FEW FACTS
PLANT TO BE COMPLETED AUG. 1924
PURPOSE OF THE URBANA-CHAMPAIGN SANITARY DISTRICT
To relieve overloaded Sanitary sewers of the two Cities and prevent human filth from polluting resident basements. The Boneyard Branch Saline drainage ditch and Salt Fork Creek.
PEARSE-GREELEY & HANSEN
ENGINEERS FOR DISTRICT
TEMPORARY OFFICES OF DISTRICT
FLAT-IRON BLDG-URBANA
ENGLISH BROTHERS
GENERAL CONTRACTORS
CHAMPAIGN ILLINOIS

SIGN ERECTED NEAR THE CHAMPAIGN-URBANA SEWAGE PLANT, GIVING INFORMATION TO TAXPAYERS AND INVITING INSPECTION

A large sign with data on the plant was placed on the construction site. This was found to be of continuous interest to vistors during the construction of the works. The copy for this sign was developed with considerable care to present only those facts that would be of interest and value to the layman.

Types of Pavement for Railway Crossings

By P. L. Brockway
City Engineer, Wichita, Kans.

THE troublesome details of construction and the type of surface in railroad crossings of paved streets are, apparently, the least standardized of all the many details of street improvement. The earliest type of crossing, especially on highways and unpaved streets in the cities, consisted simply of planks of greater or less width and approximating the height of the rail, spiked on to the cross-ties, one on each side of each rail. Further development and greater vehicular traffic caused this type of crossing to expand into a solid wooden floor between the rails, leaving sufficient room for the flanges of the car wheels. As street paving developed, this type of surfacing simply developed along with it for the full width of the paved portion of the street, and with varying degrees of smoothness of surface of the plank roadway.

Among the series of crossings on paved streets, which came under my personal observation, were half a dozen constructed with considerable care in tracks carrying a large amount of heavy rail traffic and also up to 5,000 or 6,000 vehicles per day. These planks were of white oak, 4 inches in thickness, shimmed up on the ties to a surface which would have been entirely satisfactory in a freight-house floor, being constructed by a carpenter gang accustomed to such work. The railroad crossed the highways at a small angle so that the crossings averaged over 100 feet in length. The plank immediately began to warp, twist and wear, so that in three years' time it had to be entirely replaced. Lumber is becoming increasingly expensive and of decreasing quality and is entirely inadequate to stand up under the impact and abrasion of

rapidly moving automobile and truck wheels hopping across the flangeway which is necessary on a railroad crossing.

Bituminous Surfaces

Attempts have been made, with varying degrees of success, to construct crossings with bituminous macadam surfaces or even with plant-mixed bituminous surfaces. In one city it is the custom to tamp the ordinary crossings with stone ballast up to the top of the ties and fill in above that with an ordinary asphaltic concrete surface which requires only a small amount of maintenance each year at a relatively low cost, and in which the flanges cut their own grooves without damage or disturbance to railway traffic; this, of course, leaves a minimum gap for highway traffic to jump across. At other locations where this has been tried it has been an absolute failure. The most obvious reason for the difference between success and failure is, no doubt, a difference in methods in construction, and I have thus far been unable to get details of methods which have proved successful.

One or two roads which have given information on the subject have practically standardized on a patented bituminous preparation which is mixed cold and tamped in the tracks. My observation of this particular type of crossing is that it is not a success. The railroad engineers insist that this surface can be made all right, but admit that under railroad maintenance conditions it is practically impossible to place all of these surfaces with experienced labor and foremen. The result is that the ordinary section crews handle the work and the pavement lacks the admixture of brains which is necessary.

Concrete Slabs

The Portland Cement Association has developed a type of surface consisting of reinforced concrete slabs set into the track in sections, the slabs being of such size that two of them fill up a space between the rails and a narrower strip outside the rails. Many of these crossing slabs have been placed and have given excellent service where vehicular traffic is not too severe. Concrete, however, does not possess high resilience, so that it chips and wears badly under the impact of wheels jumping across the flangeway. These slabs are heavy and unwieldy when it becomes necessary to remove them, to surface up the track.

Wood Block

Wood block interests have also developed a type of filled-up crossing slab. This consists of a double length of creosoted plank as a foundation, one layer being across the other, having a 4 x 4 of creosoted lumber bolted around the outside edge to form a container for the creosoted blocks, which are toenailed to the bottom and fill up the inside space. I have never seen this type of crossing, but it occurs to me that the flat grain of the outside dimension stuff would wear down so rapidly under heavy traffic that it would not prove very satisfactory. This type would be especially useful in crossing-frogs because of the ease with which it could be made of any size and shape and because there is very little highway traffic over the frogs if it can possibly be avoided.

All of these surfacing materials discussed are entirely independent of foundation of the tracks and, in fact, practically all of them are made entirely independent of the foundation and removable from the track, so that it may be surfaced and lined at any time. It appears to be quite generally accepted that it is very undesirable to attempt to hold a hard, rigid support of concrete under and around the ties in any track subject to high-speed, heavy railroad traffic. Railways are generally getting away from this condition even in pile bridges, all of that construction being ballast decks. Slow-speed or industrial tracks within the cities are in a different class.

Crossings for Slow-Speed and Industrial Tracks

We have had in use in Wichita for more than ten years on industrial tracks a crossing consisting of 12 inches of concrete under the ties for their entire length and continuing up to the base of the rail around them, making the total depth of the concrete 18 inches and without reinforcement. The guard-rail necessary to form a flangeway is set inside of each running-rail, with the ball of the guard-rail turned under the ball of the running-rail. Outside each running-rail is placed a row of creosoted wood blocks with the grain vertical, set between ¼- and ½-inch below the top of the rail. They become broomed down even at that depth by overhanging wheels of the railroad vehicles. Outside of these blocks and between the guard-rails inside the track is placed an ordinary brick pavement surface with bituminous filler on a sand cushion. One crossing including five tracks has been in use with this type of pavement for ten years. The only maintenance required in this time has been the replacement of the guard-rails on one track which crowded out of place after seven or eight years of traffic and readjustment of the pavement at one rail joint. This

type of crossing has proved so successful that we use it uniformly for slow-speed and industrial tracks.

Wichita Crossing for Main-Line Traffic

From this there was developed in Wichita some years ago a type of crossing for main-line traffic used by the heaviest type of locomotives, with varying degrees of success. The foundation consists of a concrete slab 15 inches in depth, its upper surface 4 inches below the bottom of the ties. The bottom of the slab extends 10 feet beyond the edges of the paved roadway, the upper surface being sloped down 8 inches in this 10 feet. Over this is placed ordinary ballast, which, in turn, reduces from 12 inches at the end of the slab to 4 inches across the paved area. The track is put in service over this and is allowed to be operated for a while in order to thoroughly compact the ballast. The concrete is then placed between the ties more as a means of preventing the sand cushion from sifting out from under the brick than to add any strength or rigidity to the construction. On this is placed a brick surface as described for the industrial tracks. Such paved strips have been in use since 1916 in two streets which cross four tracks near the foot of approach grades to elevated tracks over which three hundred trains pass daily. Vehicular traffic over one crossing, according to a recent traffic count, amounts to about 12,000 cars and trucks per day in the width of 40 feet. These crossings have been fairly successful, very little maintenance having ever been given them. Others have not proved successful, possibly because it is difficult to hold main-line rail traffic off the crossing long enough for the concrete to set sufficiently to prevent its breaking up. This results, of course, in considerable wave action in the track, and the brick surface soon becomes a scrambled mass.

It is practically impossible to hold any kind of concrete pavement under and adjacent to crossing-frogs, owing to the terrific impact of railroad traffic. The Union Pacific at Topeka, Kans., attempted, some years ago, to hold the crossing rigid, regardless. This crossing-frog is in a street-railroad track crossing a railway track, and is in the street adjoining the passenger station, so that a very large percentage of the railway traffic is slow speed. The details of construction included a concrete slab 2 feet deep under the ties, reinforced both ways with old rail and carried up between the ties to the bottom of the rails. New crossing-frogs, consisting of new 90-pound steel with corners held in solid cast manganese steel blocks, were installed. The foundation held, but the crossing-frogs were torn all to pieces within six months.

Because of the practical difficulties in connection with the hard concrete base under a high-speed track, we developed experimentally another type of surface which has been in use for three or four years and which can be used in any track without any special or unusual consideration being given to the foundation.

There is no question but that creosoted wood blocks properly treated and properly laid are highly resilient and durable and relatively light in weight. Using this material for the wearing surface, the crossing was constructed with steel pans for containers for the blocks. They were built up with 3/16-inch bottom plates and 3 x 3 x ¼-inch angles riveted at each edge. The sections were between 7 and 9 feet long, according to the total length of the crossing, for convenience in handling. Sections outside the rails are made 18 inches wide to extend out to the end of the ties; those between the rails are made of sufficient width so that two of them, side by side, fill up the space between the rails. Two short pieces of 2 x 2's are riveted on the outside of the pan with one leg horizontal to extend under the ball of the rail to provide flangeway. The metal is given a coat of pitch to protect it from rust, and the blocks, either 3 or 4 inches long, depending on the depth of the rail, are laid in the pans, being carefully fitted in. One-half-inch bolts are run through the pan from side to side and through the blocks on about 2-foot centers, after which a bituminous filler is poured between the blocks and the bolts are drawn up tight in order to hold the blocks securely in place so that the pan may be handled as a unit. In the earlier construction there was no container across the ends of the pan excepting the bolt a short distance from the end, and blocks were pieced in across the joints as the sections were laid. In later construction we placed a metal strip of sufficient width and strength across the end to prevent the blocks from becoming dislodged, and yet not stiff enough to prevent the bolts from being tightened up on the blocks. We were able to place some of these at the cost of $12 or $14 per track-foot, which is admittedly high-priced and can be justified only if they will have an unusually long life and at the same time give satisfactory service. The earliest of these have been in use four or five years, and there are eight crossings constructed. So far they have proved entirely satisfactory. We had in mind

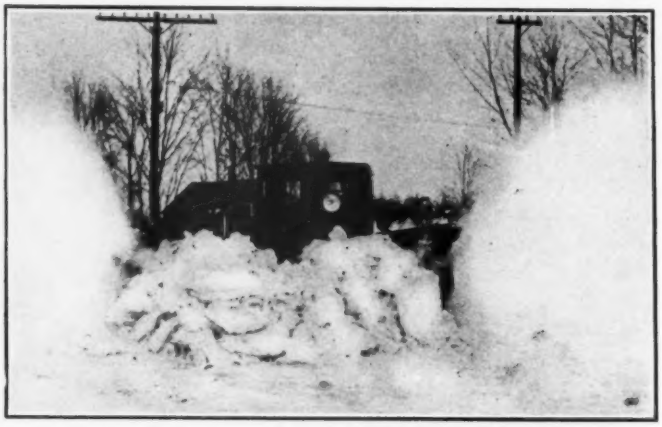
in the first place that they should be spiked down, but we find from practice that, while they are not so heavy that the ordinary section crews cannot handle them, they still have sufficient weight to hold them in place. No maintenance has been required on any of them, and one crossing has been removed to lay new rails and has been replaced without any difficulty.

ACKNOWLEDGMENT.—From a paper read before the American Society for Municipal Improvements, at Boston, Mass.

Snow Removal in Michigan Counties

Interesting Facts from Iron County, St. Clair County, Alger County and Saginaw County

H. F. LARSON, County Road Engineer, Iron County, has truthfully said, in *Michigan Roads and Pavements*, that "A road not open to traffic is of precisely the same value as no road at all, as long as it remains snow-bound." The public today uses highways to an extent never before dreamed of. Any community that has once been able to go at will from its farm homes to a neighboring city, or travel at will from town to town during summer and fall, is not going to be content to have its freedom of travel shut off by winter snows.



THE IRON COUNTY PLOW BREAKING THROUGH

Iron County has been experimenting with the snow-removal problem for the last five winters. A limited mileage was first attempted, using a 20-ton Army Holt tractor for power. The following year two of the 10-ton Army Holt tractors gave better service. Two years ago excellent results were secured, but, the winter of 1922-23 being an unusually bad one, it was decided to purchase new equipment before the next winter set in. Two plows and tractors, including a rotary plow, were purchased.

REAR VIEW OF IRON COUNTY PLOW IN ACTION

During the winter of 1923-24, 64 miles of state and county roads were kept open and the busses operating between Crystal Falls and Iron River never lost a trip. The cost for the entire winter was as follows:

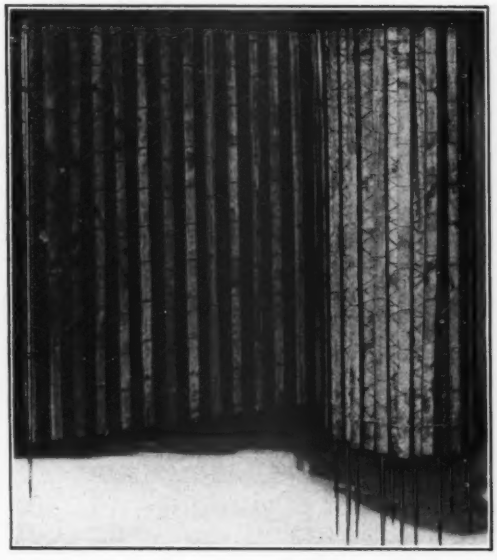
COST OF SNOW REMOVAL, JANUARY, FEBRUARY AND MARCH, 1924

Labor, gas and oil	$1,641.67
Equipment, rentals (as rated by State Highway Department)	812.70
	$2,454.37
Mileage	64 miles
Cost per mile, including rentals	$38.35
Cost per mile, not including rentals	25.65

We are indebted to H. F. Larson, County Road Engineer, for the illustrations on this page

These figures include the operation of two outfits with two men to each crew. While the winter was not as severe as the winter of 1922-23, nevertheless the county officials have been satisfied that the outfits handled the work effectively.

One of the features which Iron County has been working on for the last four years is the buying up of additional right of way through the timber section of the highway system as a snow-drifting preventive, thus making snow removal easier and at the same time preserving the scenic beauty of the roads. In places where drifting is bad and where no timber exists, additional right of way will be purchased as far as possible and spruce, balsam, pine, etc., planted so as to make a natural barrier at least 50 to 100 feet wide to prevent snow from piling up on the road. Snow-fences have been used very effectively and it would be practically impossible to do without them.



Courtesy Wickwire-Spencer Steel Corp.

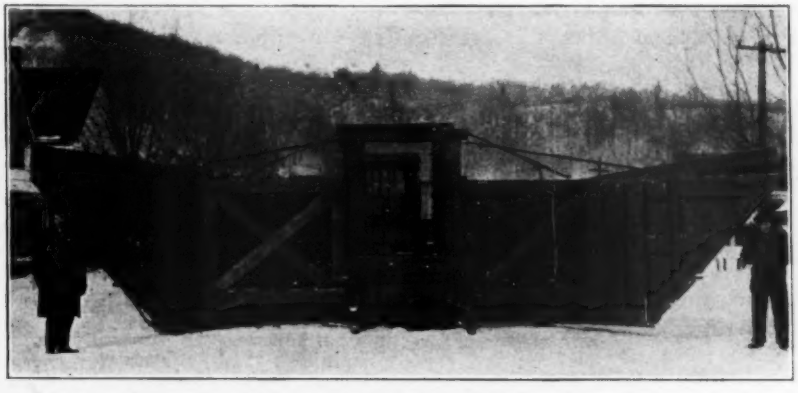
SNOW-FENCE MADE OF WOVEN WIRE, WOODEN SLATS AND STEEL POSTS

Snow-Drifts the Problem in St. Clair County

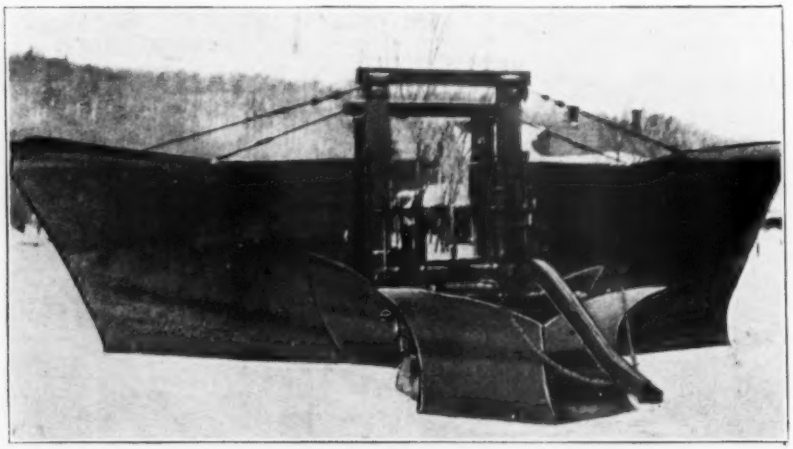
W. W. Cox, County Road Engineer and Manager, St. Clair County, is convinced that a large percentage of the snow-drifts that block highways in winter can be eliminated by drift-prevention measures, and a campaign has been undertaken to reduce the causes of drifts to a minimum. The county can save hundreds of dollars simply by removing unnecessary windbreaks from the side of the road, and maintenance patrol men have been instructed to locate all drifts on main county roads, with a view to removing their causes.

Observation of snow-drifts has uncovered the fact that in all cases windbreaks of some type were originally responsible for the drifting snow and that in many cases stretches of road on both sides of the drifts caused by windbreaks were entirely clear of snow. Often drifts were piled in the road when the fields on either side were covered only by a thin snow blanket.

Among the removable obstructions which serve very little purpose and which cause drifts, are board gates, board and picket fences, rail and stump fences, single stumps, brush piles and guard-rails. Gates which sometimes cause drifts that block horse-drawn sleighs can be taken care of by simply turning the gate at right angles to the fences. It is possible to tear down many board and picket fences, since few of them serve the purposes of fences and most of them are obsolete and out of repair. Rail and stump fences, many of which are no longer being used as fences



REAR VIEW OF ALGER COUNTY, MICHIGAN, SNOW-PLOW WHICH OPERATES AT 3 MILES PER HOUR



FRONT VIEW OF LEVY SNOW-PLOW USED BY ALGER COUNTY, MICHIGAN, TO KEEP ROADS OPEN

We are indebted to L. E. Adams, County Engineer of Alger County, Munising, Michigan, for the loan of these two Alger County illustrations showing the snow-plow mounted on a 10-ton crawler tractor

at all, could be torn down, to the benefit of both the traveler and the farmer. The farmer can put the wood from fences of this type to better use as fuel. Brush piles, stumps and other windbreaks can be easily removed, and all that is necessary is a little care on the part of the landowner to eliminate these obstructions. Guard-fences which often cause drifts on the roads are to be replaced by cable or woven-wire guard-fences as soon as the wooden types can be economically removed.

Snow Removal by Tractor and Plow in Alger County

According to the report of L. E. Adams, Road Engineer and Superintendent, Alger County Road Commission, to the State Highway Commissioner, snow-removal work in Alger County is handled with a Levy plow and a 10-ton Holt tractor. The wide spread of the wings makes it possible to plow the roadway 20 feet wide and allow ample room for two cars to pass. The last plowing in the winter of 1923-24 was done on February 21 and in some cuts the snow was rolled up to a height of 9 or 10 feet with the wings of the plow fully spread.

Up to February 24 there had been a snowfall of 100 inches in the county, which is an average for that section. The cost of plowing for the entire season was $144.56, and the average cost per mile $38.14.

Snow-Removal Costs High in Saginaw County

Between $19,000 and $20,000 was spent in Saginaw County during the winter of 1923-24 to keep the principal trunk lines free of snow. Excessive snow and the unusual mileage which was cleared probably account for this high figure. Such an investment is very much worth while, and when it is considered how greatly traffic is facilitated by keeping the roads clear, expenditures up to $100 to $200 a mile are reasonable.

A Bureau of Municipal Research for the League of Nations

IF present plans are carried out, the League of Nations will establish at Geneva a bureau of municipal research to serve all the countries affiliated with that international association. The idea was brought before the fifth Assembly of the League last September, by the Cuban delegate, who based his action on a recommendation of the Fifth Pan-American Conference, held in Chili in 1923. The project for establishing such a bureau was cordially received by the Assembly. Delegates from several countries spoke in favor of it. All recognized the advantages that might come from pooling the world's experience in municipal administration. After a very illuminating discussion of the idea, the Assembly of the League passed a resolution instructing the Secretariat to prepare a grand plan and report it to the next Assembly for action. This resolution was adopted on September 20, 1924, and the Secretariat immediately began to collect materials and study the problem. Those who have anything to do with municipal affairs, either as practitioners or as students, will watch with the keenest interest the action of the Secretariat and the League of Nations on this significant project.

CHARLES A. BEARD.

Improving the Subgrade for Pavement Foundations, and the Results

By Clarence D. Pollock
Consulting Engineer, New York, N. Y.

MUCH more attention is now given to the study of subgrade conditions than formerly, because its importance is understood. The United States Bureau of Public Roads has been, and is now, carrying on tests, the results of which will be of great assistance to engineers having to do with the designing and constructing of pavements. Others also are devoting a great deal of attention to this matter, and the result is that much information is being obtained from which at least some general conclusions may be drawn.

It has been found that when the subsoil consists of sand or other good granular and porous material, a 6-inch foundation of the standard 1:3:6 mixture of portland cement concrete is ample to place under pavements to carry modern traffic; but the question is, what is to be done when the soil consists of clay or other material which may become plastic and will not afford sufficient support for the foundation during at least part of the year? Placing a greater depth of concrete will help in spreading the load over a greater area of the soil; but it is expensive, and if the soil is one which has a considerable volume increase with the increase of its water content, this will not materially help matters, as the swelling of the soil will heave the heavier concrete about as readily as it will the lighter. If, instead of using a greater depth of concrete under such conditions, a layer of the clay or plastic material be removed and replaced by a granular and porous material such as sand, gravel, or steam cinders, and the concrete foundation be placed upon this material, it has been found that the subsoil does not swell and lift the pavement. This granular layer not only provides drainage but distributes the load over a larger area, similar to the ballast under railroad ties. It also decreases the friction on the underside of the concrete and thus helps in preventing the formation of cracks. It has been found that with clay against the underside of the concrete, with even very small differences in temperature between it and the concrete, there is a condensation of moisture on the underside of the concrete, which in cold weather freezes and when thawing adds to the volume increase and consequent heaving of the pavement. With the porous layer between the foundation and the clay subsoil, there is no condensation on the bottom of the concrete and thus this trouble is avoided.

Continued Study of Soils for Subgrades Recommended

"So many millions of dollars are being spent on highway and street pavement each year that it would seem as though as much thought should be given to the soil and foundation conditions for pavements as is given to these features in connection with buildings. The soil condition should be studied, and if it is not of a suitable character to support the pavement and its traffic properly during all seasons of the year, it should be corrected so that it will do so. We have been so keen for standardization in recent years that we have probably overdone it in the matter of using a standard of 6 inches for depth of foundation in many cases where a less depth would have been sufficient."

This paper is a continuation of the study by Mr. Pollock of the "Relation of Depth of Foundations of Pavements to Their Strength," which appeared on pages 11-13 of the January, 1924, issue of THE AMERICAN CITY.

Other Attempts to Control Moisture in the Subgrade

Other methods have been tried for improving the clay subsoils, such as in the case of the Bates Test Road in Illinois. It has been pretty well demonstrated that the bearing value of most clay soil is greatly affected by their moisture content. In connection with the Bates road tests attempts were made to control the moisture content of the subgrade clay. Under each edge of one section a tile drain was laid 24 inches below the subgrade, the trench was backfilled with cinders, and free outlets were provided for the drains. During a period of three years the moisture content of the subsoil of this section was ob-

served and compared with that of adjacent sections without such drains, but no measurable difference in the moisture content of the subgrade was found. In another longer section on the Chatham Road having a different character of clay, a similar test was made, except that the drains were placed at a depth of 42 inches below the subgrade at each edge of the pavement. Here a greater amount of moisture was found at all times in the soil with the drains than in that of the adjacent sections without drains. No attempt was made to explain this, but it showed at least that the drains did not improve conditions. Tests were made by reversing the process in the case of each of these roads by attempting to further saturate the clay under them, but this was also unsuccessful. It was found that with the normal summer saturation those clays resisted further saturation. In other words, the attempt to control the moisture content of these clays by means of tile drains was a failure. Other experiments indicated that if the moisture content of these clays was reduced to a point where they were dry enough to crumble readily, absorption took place rapidly until they reached the point of saturation, and then absorption stopped. These tests showed that clays with their normal moisture content resisted both an increase and a decrease of moisture.

Between the sands and the clays there are many soils which are mixtures. Which of these will properly support a pavement and which will require a porous layer under the pavement foundation? The Bureau of Public Roads is now investigating this side of the problem. Because of the many kinds of clays in the soils and their different effects, it is probable that no very definite rules may result, but some general conclusions may be drawn, such as that a soil high in clay and high in water absorption will usually have a high volume change and consequently require the placing of a granular layer at the subgrade. The judgment of the engineer from his experience must play an important part in deciding where to draw the line, however. Naturally, there are many cases of streets and roads where the clay will be found only here and there in pockets, and it will be necessary to place the porous layer at these points only. Other cases will occur where it may be more economical and serve the purpose as well to add a small amount of sand to the soil, and plow or otherwise work it into the subgrade in order to make it sufficiently porous.

Thickness of the Granular Layer

Studies are now being made to determine the proper thickness of the granular layer when it is required. The writer has obtained good results by the use of 5 inches and even 4 inches, and understands that others report excellent results with some clays by using a thickness of 3 inches of granular material. In tests with some clays and a careful placing of the sand layer, a 2-inch depth has proved successful, but it would seem better to use a greater thickness than 2 inches because of the difficulty of obtaining sufficient uniformity of depth in actual construction.

Another advantage of a greater depth of the granular layer is that this layer will distribute the loads better on the subsoil. Tests tend to show that it may be possible to decrease the thickness of concrete foundations below the standard 6 inches in many cases by the use of a porous layer, because of this feature of its distributing the load over a greater area of subsoil. More tests along this line are desirable, and some are being made. If further results confirm those previously obtained, there should be many valuable data available from which to make deductions as to what extent the depth of concrete foundations may be reduced in many cases, and also as to the use of other and less expensive forms of foundations under certain conditions, such as in highways and streets in many of the smaller cities and towns. It is probable that it will be desirable to continue the use of concrete foundations 6 inches in depth in the larger and faster-growing cities, because with the frequent openings due to the constant changes in the structures along the streets in such places, the bridging effect is valuable, if the back-fill in trenches settles, as it is likely to do in many cases; but in other places where few openings may be looked for, it is probable that a considerable saving may be made on the foundation so that a better and more durable pavement surface may be afforded. The writer has laid a large amount of granite block pavement on a 5-inch cement concrete foundation on sandy and gravel subsoils without foundation failures, as well as many miles of asphalt similarly without foundation troubles; likewise, he has had excellent results from a rolled broken-stone base over a similar subsoil when the location was such that it was not subjected to trench openings, and was paved with granite blocks subjected to heavy truck traffic.

So many millions of dollars are being spent on highway and street pavements each year that it would seem as though as much thought should be given to the soil and foundation conditions of pavements as is given to these features in connection with buildings. The

soil condition should be studied, and if it is not of a suitable character to support the pavement and its traffic properly during all seasons of the year, it should be corrected so that it will do so. We have been so keen for standardization in recent years that we have probably overdone it in the matter of using a standard of 6 inches depth of foundation in many cases where a less depth would have been sufficient. The standardizing should have been below the foundation, and the soil standardized instead, by bringing the soils of poor supporting value up to proper standards. In this way much money might be saved and the saving devoted to constructing more miles of pavement or to more durable forms. We should all be interested in this question of improving the subgrade for pavement foundations, whether we are engineers, contractors, material men or just taxpayers, as it will benefit every one of us.

ACKNOWLEDGMENT.—From a paper read before the American Society for Municipal Improvements, at Boston, Mass.

Los Angeles Saves $60,000 Annually by Motorizing Its Flushers

By Charles E. Nash
Cost Accountant, City of Los Angeles

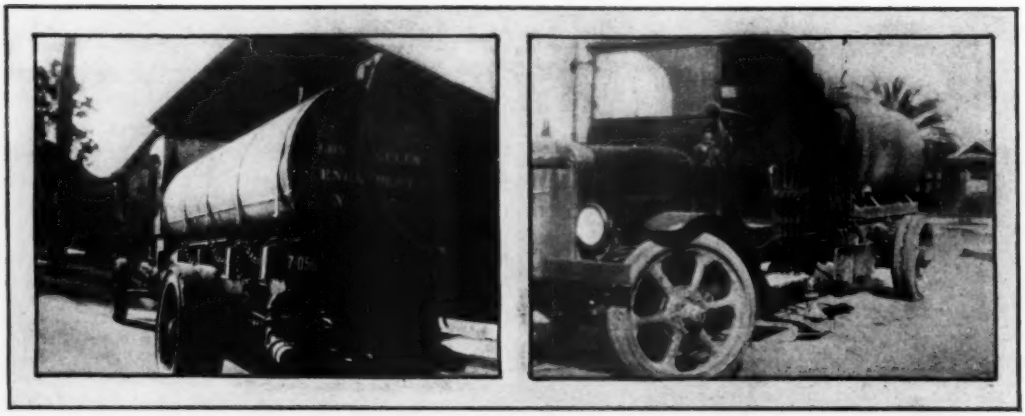
MOTOR-DRIVEN flushers in Los Angeles have permanently supplanted horse-driven flushers, because they give more efficient service at reduced cost. Before the inauguration of motor-driven flushers we employed 48 to 50 teams on flushing service at an annual cost of $75,000 to $90,000. We now employ six motor-driven flushers at an annual cost of $25,000 to $30,000. The flushing service is, however, supplemented by vacuum cleaning service at a cost of $25,000 per year. We employ four vacuum cleaners working two shifts of eight hours per day. At the present time there are 428 miles of paved streets in the area to which flushing is confined, while seven years ago there were 316 miles, an increase of 35 per cent.

Flushers First Rented

Ten years ago, with 166 miles of paved streets and a total of 1,350 miles of paved and unpaved streets, we employed from 75 to 100 teams and wagon sprinklers sprinkling unpaved streets, and 47 to 50 teams and wagon flushers flushing paved streets. On April 1, 1916, with 413 miles of paved streets, we employed 40 teams and wagons sprinkling unpaved streets, and 51 teams and wagons flushing paved streets. The large increase in paved streets and total mileage from 1913 to 1916 was principally due to the annexation of the San Fernando valley and Palms annexation districts during the year 1915, the streets in neither of which are given sprinkling or flushing service.

During April, 1916, the city inaugurated the use of motor-driven sprinkling and flushing equipment by contracting for the use of five Moreland motor-driven sprinkler and flusher units on a per diem rental basis. Primarily this was for the purpose of providing sprinkling service at a reduced cost, the flushing being a secondary consideration. Previous to this installation the annual expenditure for sprinkling and flushing was approximately $175,000. On the termination of the contract the use of teams for sprinkling was gradually reduced, and owing to the large increase of improved streets with permanent pavement or an oiled gravel surface, sprinkling service for several years past has been entirely eliminated. With the exception of a few teams used for flushing down-town alleys, no flushing is now done with team-drawn flushers.

In August, 1921, the city purchased the five sprinkler-flusher trucks equipped with 1,200-gallon capacity steel tanks mounted on 5-ton chassis. They are equipped with pumps capable of maintaining a working pressure of 50 pounds per square inch. This equipment sprinkles a width of 60 feet, 30 feet on each side of the truck. The pump is operated by the truck motor. This has proved to be a serious mechanical defect, as when the velocity of the truck is increased, less power is available for the pump, with a consequent reduction in the water discharge at a time when the discharge should be increased. These units have now been in service over seven years, and during a large part of this time have been operated two shifts of eight hours per day.



TWO VIEWS OF MOTOR FLUSHERS IN THE SERVICE OF THE LOS ANGELES ENGINEERING DEPARTMENT

Type of Flusher Pumps

In April this year we purchased one Moreland 3½-ton chassis equipped with a 750-gallon South Bend flusher unit. This flusher has four nozzles, two in front and two just back of the driver's seat. The pump is operated by an independent motor and discharges 500 gallons per minute at a pressure of 45 pounds per square inch when the nozzles are in use. While this equipment has been in use only a few months, it has demonstrated a superiority over the old equipment due to having an independent motor-operated pump, making it possible to maintain a greater working speed and at the same time secure more force in the discharge so necessary for efficient flushing. However, it can be improved by using a 1,200-gallon, or larger, tank to attain a gerater working radius for the outfit.

Cost Comparisons

Used as sprinkling units, the five motor sprinklers each did the work of four to four and one-half teams. In 1916, when they were first installed, the cost per mile for sprinkling with team-drawn sprinklers was $1.09. With motor-driven sprinklers the cost was reduced to 85 cents per mile. Team hire then cost $6.00 per day compared with $9.60 at the present time, whereas the cost of operating the motor units now hardly exceeds the rental paid at that time.

Team-drawn flushers during the year ending June 30, 1917, the last year in which teams were used for street flushing, flushed an average of 37,800 square yards each per 8-hour day at a cost of 15.74 cents per 1,000 square yards. Team hire cost $6.00 per day, including the allowance for holidays and vacations. Motor-driven flushers flushed an average of 97,200 square yards per day of 8 hours at a cost of 15.14 cents per 1,000 square yards on a basis of $14.71 per shift for two shifts per day, and $15.65 per shift for one shift per day.

Team-drawn flushers were operated in tandem, the head flusher working about 12 feet from the curb, and the rear flusher about 6 feet from the curb. The motor-driven flushers flush approximately the same width of pavement as two team flushers. At the present time our plan is to flush a strip 6 feet wide on each side of the street next the curb. This is more efficient than where a wider strip is flushed. It results in a smaller area flushed per unit per shift and a higher cost per unit area, but gives better results and a less ultimate cost per mile of street flushed.

The five original flushers are now flushing 5.60 miles and 39,447 square yards per unit per 8-hour shift at a cost of $2.50 per mile, or 35.7 cents per 1,000 square yards. It costs $14.06 per 8-hour shift to operate these flushers, including the cost of the driver, fuel, depreciation, repairs and interest on the investment. The machines are operated two shifts each day, which, of course, reduces the cost of operation per shift. The last unit, with the 750-gallon tank, flushes 5.75 miles and 43,825 square yards per shift at a cost of $2.65 per mile, or 34.8 cents per 1,000 square yards. It costs $15.26 per shift to operate this unit, including the same factors of cost as for the first five flushers.

ACKNOWLEDGMENT.—Reprinted from *Power Wagon*, Chicago.

THE INDEX TO VOLUME XXXI OF THE AMERICAN CITY (JULY-DECEMBER, 1924) will be found at the end of the December issue.

A Survey of Street-Lighting Practice in the United States

By J. Franklin Meyer

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A COMPREHENSIVE survey of street lighting practice has been in progress for some time by the Bureau of Standards, and this paper is a preliminary statement of some of the results obtained. It has been made possible only through the cordial cooperation of the operators of electric light and power systems, municipalities and the manufacturers of street-lighting equipment.

The survey has been confined almost entirely to the electrical aspects of street lighting. It has been possible to obtain only very meager information on gas lighting and practically none on oil, acetylene, and gasoline lighting, although these types of street lighting are still used in many cities, even in some of the largest. No attempt has been made to make field measurements of illumination, nor have the artistic and esthetic aspects been given consideration. The main purpose has been to ascertain as fully and completely as possible the present standards of electric street illumination in cities of 10,000 population and over, omitting, however, all cities of population in excess of 500,000, since in these very large cities conditions are special and unique. A series of questionnaires was carefully prepared and submitted to the 730 cities listed in the population bulletins of the Bureau of the Census, 1920.

As it was obviously impossible to cover all phases of street-lighting practice in American cities, the questionnaires were limited in scope to four of its leading aspects: (1) general information as to total mileage illuminated, total kilowatt-hours sold for street lighting, and total revenue received; (2) details as to number, types and sizes of lamps installed; (3) details of a mile of street having maximum illumination; and (4) details of a mile of street having minimum illumination. Construction, installation, and operating practice has been obtained from a considerable number of the larger utilities that very kindly furnish the Bureau with blue-prints and specifications covering details of their street-lighting systems. Street-lighting contracts have been furnished by a large number of municipalities, and numerous private contracts and methods for financing privately owned installations were communicated to us.

The Bureau of Standards has made a comprehensive survey of street-lighting practice in the United States, including cities of population between 10,000 and 500,000. Seven hundred and thirty cities were included in the original plans for the survey, 362 of which cooperated with the Bureau by furnishing engineering and statistical data.

The cities are divided into 10 groups on the basis of population, so that in no case is the range of population in any group greater than two to one. For each group of cities data are given, showing the average cost of street lighting per capita and per mile; the intensity of lighting on the best lighted streets, and on the streets having the lowest intensity, as well as the average lighting for the group; the percentage of street lighting by arc lamps and by incandescent lamps; the total energy used per mile for street lighting; and other technical engineering results.

It is shown that in the largest cities (300,000 to 500,000 population) 59 per cent of the street lighting is by arc lamps; in the smallest cities (10,000 to 20,000 population) only 20 per cent is arc lighting. The survey shows that in the group of cities which stands highest the best-lighted streets have lighting equipment furnishing on the average 155 lumens per linear foot of street, while in the group of cities which go lowest the worst-lighted streets average only 3.7 lumens per foot. The maximum intensity reported for any street in any city is 523 lumens per foot, the minimum 0.3 lumens per foot. The highest average annual cost per mile of street lighted for any group of cities is $708, the lowest $408 per mile. The average cost per capita per year for the various groups varies from $0.74 to $1.02.

Replies to the questionnaires were received from 362 cities, or approximately 50 per cent. Upon receipt, each questionnaire was very carefully checked for possible discrepancies. Those which showed apparent discrepancies were corrected or in some cases returned for further information. It was realized that to answer all the items asked for required considerable labor on the part of the utility or municipality concerned, and great credit is due the cooperating utilities for the painstaking care with which the responses were generally made out.

It is believed that the results give a fairly representative cross-section of street-lighting practice in the United States. It is not possible to say how many cities are lighted by municipally owned and operated plants, and how many by public utility plants. Almost

every imaginable combination of utility, municipal, and community operation exists, and there are few cities where the local utility corporation owns and operates the entire street-lighting system, or where the municipality owns and operates the system completely. Individual business men, associations of merchants and citizens, and local city communities may own the lighting equipment, either entirely or in part; the city may own the distributing system and the lamp-posts, while the lamps and accessories are owned by the utility, or conversely. On the same street there may be two separate systems or business arrangements for lighting as between the municipality, the merchants association, and the local electric light and power company. No standard practice can be said to exist in this respect.

The 730 cities having populations between 10,000 and 500,000 were arranged in ten groups, as shown in Table I. More than

TABLE I.—RANGE OF POPULATION, NUMBER OF CITIES, AND THEIR GROUPING

Group Number	Range of Population	Average Population of Group	Total Number of Cities in Group	Number of Cities from Which Data Were Received
1	300,000 to 500,000	376,000	9	6
2	200,000 to 300,000	236,500	12	9
3	150,000 to 200,000	169,500	10	8
4	100,000 to 150,000	122,000	26	12
5	75,000 to 100,000	87,500	25	15
6	50,000 to 75,000	60,900	53	30
7	40,000 to 50,000	44,400	40	26
8	30,000 to 40,000	34,400	65	37
9	20,000 to 30,000	24,100	108	54
10	10,000 to 20,000	13,750	382	165
	Total.....		730	362

half the cities fall in group 10, viz., 10,000 to 20,000 population, and 67 per cent in the ninth and tenth groups. Only in group 10 is the range of population as great as two to one. The purpose has been to group cities so that essentially the same illumination requirements would be applicable. Of the 362 cities from which replies were received, 219, or 60 per cent, fall in the groups of 30,000 population and under.

Table II shows average values for the total load in lamps installed, the total energy consumption, including losses, the percentage of arc lamp and incandescent lamp load, and the load per mile of illuminated street. The energy consumption is based on a 4,000-hour annual operation. However, a large percentage of street-lighting lamps are operated on a part-time schedule, so that the results given are maximum figures.

The results given in Table III are all on the basis of averages for each group of cities and should be compared with the figures

TABLE II.—THE AVERAGE STREET-LIGHTING LOAD AND ENERGY CONSUMED PER YEAR IN LIGHTING STREETS OF CITIES OF VARIOUS GROUPS

The percentage of load in arc and incandescent lamps was obtained from the total group load and is not an average.

Group Number	Kilowatts of Lamps Installed	Kilowatt-Hours Total Including Losses	Per Cent of Total Group Load: Arcs	Incandescents	Miles Illuminated	Kilowtts Per Mile
1	1945	8,260,000	59	41	622	3.4
2	1275	5,460,000	40	60	398	3.4
3	682	3,120,000	29	71	332	2.3
4	592	2,490,000	55	45	172	3.7
5	420	1,750,000	40	60	194	2.5
6	295	1,150,000	24	76	136	2.5
7	208	925,000	20	80	87	2.9
8	162	657,000	28	72	77	2.6
9	109	437,000	27	73	64	2.1
10	69	287,000	20	80	41	2.0

tabulated in Tables IV and V, where maximum and minimum values are given. Lumen values are calculated from manufacturers' mean ratings for each type of lamp reported. The second column in Table IV gives for

TABLE III.—AVERAGE RESULTS BY CITY GROUPS

Group	Average Population	Miles Illuminated	Population per Mile of Street	Lumens Per Mile	Lumens Per Capita	Annual Cost Per Mile	Cost Per Capita
1	376,000	622	656	57,600	86	$558	$0.85
2	236,500	398	633	62,800	91	604	.93
3	169,500	332	560	38,800	58	427	.74
4	122,000	172	710	53,200	69	708	.86
5	87,500	194	510	41,300	82	487	.93
6	60,900	136	540	40,700	80	474	.94
7	44,400	87	658	47,500	78	554	.94
8	34,400	77	544	43,700	79	471	.91
9	24,100	64	479	36,200	74	414	.90
10	13,750	41	410	30,000	74	408	1.02

each group the average amount of light in lumens per running foot provided on the best-lighted streets of all the cities in the group, while the third and fourth columns give the largest and smallest amounts furnished by individual cities for their best streets. For

TABLE IV.—RANGE OF ILLUMINATION ON MOST BRILLIANTLY LIGHTED STREETS

The average values in lumens per foot are given for the cities in each group, together with the highest and lowest values. The average lumens per foot for all streets are given in the last column, for purposes of comparison.

Group	Lumens per Foot of Street: Average Value	Highest Value	Lowest Value	Percentage of Cities Exceeding Average	Average Lumens Per Foot for All Streets
1	117	220	25	34	11
2	155	292	75	44	12
3	128	196	66	43	7.4
4	130	523	25	34	10
5	152	241	80	57	7 8
6	128	415	15	38	7.7
7	94	314	8.3	44	9
8	95	227	9.8	42	8.3
9	77	253	1.2	46	6.9
10	66	272	0.9	44	5.7

example, Table IV shows that the maximum amount of light provided in any city of Group 2 (200,000 to 300,000 population) is 292 lumens per running foot, but that 75 lumens per foot is the maximum furnished in another city in the same group, while 155 lumens per foot is the average on the best-lighted streets

of the whole group, with a general average of 12 lumens per foot for all cities of the group when all streets are included. Similarly,

TABLE V.—RANGE OF ILLUMINATION ON WORST-LIGHTED STREETS

The average values in lumens per foot are given for the cities in each group, together with the highest and lowest values. The average lumens per foot for all streets are given in the last column, for purposes of comparison.

Group	——Lumens per Foot of Street—— Average Value	Highest Value	Lowest Value	Percentage of Cities Exceeding Average	Average Lumens Per Foot for All Streets
1	7	16	2.0	50	11
2	12.3	49	1.2	38	12
3	3.7	6.8	1.9	50	7.4
4	16.1	38.6	1.9	36	10
5	6.2	22.7	0.7	36	7.8
6	10	79.0	0.7	43	7.7
7	9.5	53.5	1.4	35	9
8	7.8	19.3	0.6	46	8.3
9	7.0	38.0	0.3	39	6.9
10	4.9	19.3	0.5	36	5.7

from Table V, the lowest level of illumination in any city of Group 2 is 1.2 lumens per linear foot, but the best-lighted city of the group does not go below 49 lumens per foot.

The results tabulated in Tables IV and V are given on the basis of length of street lighted, no consideration being given to the width of the streets. In Table VI the same

TABLE VI.—LUMENS PER SQUARE FOOT OF STREET SURFACE, MAXIMUM AND MINIMUM

Group	—For Best-Lighted Streets— Average Value	Highest Value	Lowest Value	—For Worst-Lighted Streets— Average Value	Highest Value	Lowest Value
1	1.77	3.3	0.33	0.126	0.23	0.032
2	2.21	3.0	0.98	0.135	0.31	0.030
3	1.88	2.6	1.10	0.070	0.09	0.038
4	1.60	4.7	0.37	0.279	0.75	0.046
5	2.12	4.0	1.24	0.159	0.67	0.009
6	1.95	4.3	0.29	0.170	1.25	0.019
7	1.53	4.6	0.16	0.170	1.00	0.020
8	1.42	4.2	0.20	0.135	0.36	0.036
9	1.33	4.6	0.04	0.140	0.73	0.015
10	1.04	4.0	0.02	0.093	0.61	0.008

data are expressed as the ratio of the lumen rating of lamps installed to the area of street surface illuminated. The third column, giving the maximum values found in the ten

TABLE VII.—WATTS PER LINEAR FOOT OF STREET

Group	—For Best-Lighted Streets— Average Value	Highest Value	Lowest Value	—For Worst-Lighted Streets— Average Value	Highest Value	Lowest Value
1	6.8	11.4	2.0	0.42	0.88	0.15
2	8.9	16.5	4.1	0.72	2.60	0.09
3	8.2	15.1	4.0	0.24	0.42	0.13
4	7.5	29.0	1.5	0.87	2.34	0.15
5	9.0	17.8	4.4	0.42	1.80	0.06
6	7.8	21.0	0.9	0.58	4.80	0.05
7	5.6	17.8	0.5	0.59	3.20	0.10
8	5.9	12.6	0.6	0.50	1.75	0.06
9	5.0	13.7	0.1	0.42	2.50	0.02
10	4.4	15.8	0.08	0.30	1.17	0.04

TABLE VIII.—AVERAGE ANNUAL COSTS IN DOLLARS AT VARIOUS ILLUMINATION LEVELS

Group	Cost per Capita	Average Cost per Mile	—Average Cost Per Foot of Street Lighted[1]— —Highest Level— Max.	Min.	Avg.	—Lowest Level— Max.	Min.	Avg.	Average for all Cities in Group
1	$.85	$558	$2.07	$.55	$1.19	$.10	$.03	$.07	$.11
2	.93	604	2.04	.79	1.31	.28	.04	.12	.11
3	.74	427	1.45	.75	1.10	.07	.03	.05	.08
4	.86	708	2.20	.38	1.08	.34	.05	.15	.13
5	.93	487	1.94	.78	1.25	.27	.015	.09	.09
6	.94	474	2.00	.17	1.04	.16	.02	.09	.09
7	.94	554	1.84	.07	1.02	.19	.03	.09	.10
8	.91	471	1.73	.22	.86	.26	.02	.11	.09
9	.90	414	1.93	.05	.68	.21	.005	.07	.08
10	1.02	408	2.04	.05	.72	.18	.01	.07	.08

TABLE IX.—RATIO OF SPACING DISTANCE (MEASURED BETWEEN ADJACENT UNITS ON ONE SIDE) TO MOUNTING HEIGHTS

Group	—Best-Lighted Streets— Minimum	Average	Maximum	—Worst-Lighted Streets— Minimum	Average	Maximum
1	6.0	7.3	10.0	21.0	32.0	44.0
2	4.2	8.4	23.0	9.0	22.0	44.0
3	5.4	6.7	8.7	16.5	34.8	79.0
4	4.0	9.0	19.8	10.0	20.1	40.0
5	4.4	6.5	9.2	11.4	23.7	41.9
6	3.9	7.3	25.5	11.3	22.4	40.0
7	3.6	8.1	20.0	8.3	21.2	60.0
8	5.0	7.6	16.0	6.7	21.1	35.0
9	4.0	9.3	33.0	8.0	24.5	85.0
10	—	—	—	—	—	—

groups, shows a surprising agreement in values. The ratio of spacing distance between adjacent units to the mounting height is an important factor in determining uniformity of street illumination. The range of ratios reported is shown in Table IX.

ACKNOWLEDGMENT.—A paper presented before the annual convention of the Illuminating Engineering Society, October, 1924. Published with the permission of the Director, Bureau of Standards, Department of Commerce, Washington, D. C.

Radio in Education

EVEN as the automobile has wrought a revolution under our very eyes without its educational significance being fully understood, radio is bringing about changes more far-reaching than we are aware. Merely to mention the report that nearly five hundred million dollars' worth of radio equipment is being sold during 1924 suggests the magnitude of the development. It is believed that this new means of entertainment and instruction—universal, swift, inexpensive—will raise the level of intelligence among adults generally. What will it do for the schools?

Two experiments, one conducted in the schools of Oakland, Calif., and the other in the schools of London, England, suggest possibilities. The Oakland experiment followed the plan of using teachers from the regular teaching staff. The London experiment brought in a famous musician, not primarily a teacher. In both methods there are large possibilities. Carefully planned teaching by experts can be followed by novices and the less skilled. On the other hand, well-known authorities in music, history, literature, art, politics, and science can speak to class groups in the schools, adding to the systematic instruction of the classroom the inspiration of the creative thinkers and workers who produce the knowledge that the classroom aims to transmit.

—From *The Journal of the National Education Association*, in the November, 1924, issue of which both of these experiments are described.

"Why Regional Planning?"

A Conversation

(In the depths of the subway, between two citizens. It is the usual rush hour. The reading of their newspapers abandoned as physically impossible, the two citizens engage in the following conversation:)

FIRST CITIZEN: Complaining about the condition of the subways or transit in general in this city is as futile as complaining against the weather. Fatalistic, am I not? . . . But I like New York. If a couple of million people moved out, it would be a dandy place to live in.

SECOND CITIZEN: That's not as improbable as it sounds; . . . with modification, of course. I've been following up this Regional Planning idea a bit. It's new, and I don't know that it has been developed very far yet, but it sounds like the right idea.

FIRST CITIZEN: Fine! And how do these planning chaps expect to do it? All the improvements they effect only serve in the end to increase the number of people who come into New York, and increase congestion. At tremendous expense they widen a few streets, zone a few districts, and even secure a few parks and playgrounds. We pay outrageously and, before we've caught our breath, everything is as bad as before.

SECOND CITIZEN: I agree with you—city-planning often leads to a blind sort of expansion, which only intensifies the problem. There's another way of doing it, as I see it. In planning, there are two interests to be considered: there is the interest of the expanding city and the interest of the region into which it is expanding.

FIRST CITIZEN: What do you call a region?

SECOND CITIZEN: Well—a region may be anything larger than a city; it may be a city and its surrounding territory; or a group of cities and their intervening territory. Take, for example, the cities around Buffalo, along the Niagara Frontier. They form an economic unit for the purpose of planning, and we designate that a region. Or it may be a section of a state, a whole state, or a group of states. For our purposes, we may conceive of all New York State as the region.

FIRST CITIZEN: Rather a big parcel to plan for, isn't it?

SECOND CITIZEN: Yes, but a very important unit, when you consider its characteristics. But to return to our discussion of cities. Now I doubt whether the interest of the merely expanding city serves the interest of the region in which it lies. As a matter of fact, as one studies large cities and their evils, one begins to doubt whether it is even to the interest of the city itself to expand further. We all know the type of business man who wants his city larger and larger every year. If he lives in a city of half a million, he forms clubs to "Boost our city—make it a million!" We don't seem to realize that continual crowding into big cities will soon arrive at a point at which living must necessarily become prohibitive.

FIRST CITIZEN: Oh, I realize that. Why, just look at the cost of administering this city: a million dollars a day! But— .

SECOND CITIZEN: And do you know that New York State has really developed only a small section: that 75 per cent of its population lives on less than 15 per cent of its area. New York City has 50,000 to the square mile, and within ten miles you can find areas where there are only 500 to the square mile. Fertile farm land is wasted; localities that would be ideal for industrial purposes are underpopulated, while other districts are so over-populated that even their economic efficiency is impaired.

FIRST CITIZEN: Well, what is to be done? How can you limit the size of the city? And can you disperse the people who are now living here? What about people who must come here to work in factories and offices? Suppose we do develop a whole lot of suburban communities, what will be gained if hundreds of thousands have to pour in here every morning and out again every evening? Aren't you going to have the same congestion in transportation?

SECOND CITIZEN: You're going a bit fast—and I think in the wrong direction. Is there any reason why the clothing industry, for example, —I could name half a dozen others—should be located in the central part of the city? Why can't such industries go to other localities, taking their workers along? Do you think that industry thrives best on over-concentration?

FIRST CITIZEN: I guess not . . .

SECOND CITIZEN: The decentralization of population and industry is taking place already, although very gradually, as a result of the economic inefficiency of over-concentration. That very process is a challenge and an opportunity for us to plan more broadly, so that the new communities will grow without over-developing any one center. For, after all, isn't the whole aim of planning to promote better and less complicated living?

—From the *Bulletin* of the New York State Commission of Housing and Regional Planning.

Constructive and Remedial Measures for Traffic Relief and Highway Safety

TO devise more effective methods of meeting the nation-wide problem resulting from street and highway accidents estimated to have caused during 1923 a human toll of 22,600 deaths and 678,000 serious personal injuries, and $600,000,000 economic loss, there was held in the new building of the Chamber of Commerce of the United States, in Washington, December 15 and 16, a National Conference on Street and Highway Safety. This notable gathering of some 450 registered delegates and about 100 visitors included police officials, highway and motor vehicle commissioners, and representatives of insurance companies, railroad and street railway companies, safety councils, chambers of commerce, labor unions, women's clubs, automobile associations, automobile manufacturers and various other groups.

The Conference was called by Secretary of Commerce Herbert Hoover, who had appointed, some six months previously, eight representative committees, the results of whose investigations and recommendations were published in advance of the meeting. The subjects covered were: (I) Statistics, (II) Traffic Control, (III) Construction and Enginering, (IV) City Planning and Zoning, (V) Insurance, (VI) Education, (VII) the Motor Vehicle, and (VIII) Public Relations. These reports were given detailed consideration by the Conference, after which approval was voted of a comprehensive segregation of the eight reports. This consolidated report will be made available in pamphlet form by the Department of Commerce and will also be published by THE AMERICAN CITY *in the* 1925 Municipal Index.

While the Conference recognized fully the importance of palliative measures to minimize the handicaps to traffic and the dangers to life which have resulted from the haphazard growth of most of our communities, there was special emphasis, also, on the need for more adequate control of future developments through city and regional planning and zoning.

On the following pages are published excerpts from some of the committee reports, as amended in certain details, by the Conference. The entire series of reports, totaling 130 pages, will be of interest to many readers of THE AMERICAN CITY. *For copies, application should be made to the Conference on Street and Highway Safety, Department of Commerce, Washington, D. C.*

Before adjournment, the Conference voted to reconvene about a year hence, at the call of the Secretary of Commerce; and hearty appreciation was expressed of the leadership not only of Mr. Hoover, but of Vice-Chairman F. A. Delano, and of Colonel A. B. Barber, Director of the Conference, whose efficient services had been made available by the Chamber of Commerce of the United States.

Federal, State and Municipal Responsibility

(From the Report of the Committee on Public Relations)

YOUR committee believes that the brunt of responsibility for street and highway safety rests, and must continue to rest, upon the public officials—Federal, state and local. Each group is charged with its own particular responsibilities.

Federal Government

The Federal Government's relation to the safety program is one of encouragement, of assembly and distribution of information, and the development and use of best practices, believing that uniformity will be secured by voluntary action of the various states.

State Government

The state, as the soverign political unit to which cities and other political subdivisions are subordinate, should enact constructive legislation; including enabling acts which will empower cities and other local units to provide for a proper development of their territory; legislation dealing with unorganized areas; and laws creating a state department or bureau to administer the laws applying to motor vehicles, including the issuing and revocation of licenses for both cars and drivers and also the enforcement of regulations on the highway. This may be either a separate department or a division of some existing state department. The motor department or bureau should have an adequate staff qualified by training and experience not only to handle licenses but to examine drivers, regulate traffic on the highways, investigate accidents, and enforce regulations regarding design, con-

struction, inspection and maintenance of motor vehicles.

Regulatory legislation should be for adoption by states and not by cities. The state enforcement division must have sufficiently broad powers to formulate the regulatory provisions necessary to the detailed control of traffic, leaving, however, to municipal authorities the formulation and enforcement of ordinances covering local conditions such as the establishment of parking areas, etc.

Municipal Government

There should be an adequately manned traffic division in the police department, with traffic safety a major function of such bureau. In cities the common practice of enforcement by the police department is recognized, and the police should enforce the state law within the city limits.

Traffic Planning

In all states and municipalities there should be specific provision for adequate and timely planning of traffic facilities and traffic-control measures. These activities should be closely coordinated nationally, between adjoining states, between states and their political subdivisions, and between the several agencies charged with the provision of facilities and control of their use.

In metropolitan areas which are faced with highly complicated traffic movement, it is desirable that there be established a special traffic planning commission whose duty it is to study the flow of traffic, make recommendations as to the elimination of hindrances to this flow, formulate plans for the correction of unsatisfactory and unsafe traffic conditions, etc. It may be desirable for this commission to be a division of a city-planning body.

Railroad Grade Crossings

Elimination of grade crossings, either by relocation of highways or rail lines or by grade separation, constitutes the only perfect solution of the grade crossing problem. It should be carried on under a proper program, first eliminating the most dangerous crossings on thoroughfares carrying heavy traffic. This is made difficult by the enormous costs involved and if attempted on a wholesale scale would impose an excessive financial burden resting in the last analysis upon the public. It is therefore necessary that the program, having due regard to the relative costs and advantages of grade-crossing elimination and other methods of protection, be given the most thorough joint consideration by proper authorities. In laying out new highways the question of so locating them as to avoid railway grade crossings to the greatest possible extent should be carefully considered.

Relocation of highways offers many possibilities not yet fully developed which should be worked out by the state authorities in cooperation with the railways. Authority to order grade separations or proper protection at grade crossings should be vested in the state commission having jurisdiction over the railways, which should also determine and enforce a proper division of the costs between the railroads and the public. The state highway department should have the authority to plan the improvements and to initiate the proceedings for all highways under its jurisdiction. Time is an essential element, and a prompt decision should be provided for in the law.

A properly authorized state commission should be empowered to designate certain railroad grade crossings at which all automobiles should be required to stop. The elimination and protection of grade crossings are of such importance and involve to such an extent the public safety as to require that priority be given to them, in the allocation of capital funds by the railroads and of public moneys for highway building over expenditures for other safety measures designed to protect the public.

Traffic Violation Courts

Special traffic courts, both city and rural, should be established for the prompt and effective handling of traffic violations. It is to the public interest that there be state supervision of local procedure in traffic violation punishment, to the extent necessary to secure uniformity of administration and to prevent the abuse of judicial authority.

National and Local Organizations

The value of the service rendered by such groups as the Eastern Conference of Motor Vehicle Administrators, American Association of State Highway Officials, International Association of Police Chiefs, and others of a similar standing and character, is well recognized. . . . .

All state and local law-enforcing agencies are urged to make every possible use of the cooperation of unofficial agencies and organizations, both in laying out the most effective methods of enforcement and in securing public support therefor.

Arrangement of Streets and Highways for an Orderly Flow of Traffic

(From the Report of the Committee on City Planning and Zoning)

Grade Crossings of Roadways

AT peak points of congestion and danger it is desirable and sometimes practicable to separate grades so as to carry the through traffic of one street over or under the other street. This permits a free flow of vehicular traffic across the intersection on both streets and lessens the difficulties and dangers of the pedestrian as well. Under the assumed conditions, such a separation of grades may clear up congestion for a considerable distance in all directions from the intersection.

In order to handle a maximum through vehicular traffic rapidly and safely, a roadway must be entirely free from cross-traffic interference, either vehicular or pedestrian. Such a traffic way may handle two or three times the traffic at two or three times the average speed possible under ordinary congested conditions with the frequent interruptions due to cross-traffic. Most large cities will find it necessary to build a number of such trunk-line routes or super-traffic ways. They will be costly, but not so costly as the extreme congestion that will otherwise develop.

All cities in laying out in the as yet unbuilt areas streets that may become portions of future super-traffic ways should provide the extra width necessary to facilitate a future separation of grades at important intersections. Moreover, by providing additional space for tracks and stations, the super-traffic way in the future can be made to accommodate rapid-transit train operation at comparatively small cost.

The task of separating the grades of railroads and rapid-transit lines from those of intersecting streets and highways, now well advanced in many parts of the country, should, of course, be continued.

Classification of Traffic

The most serious traffic difficulties result where there is a great mixture of all kinds of traffic (automobiles, street cars, trucks, busses, teams), especially on a narrow roadway. There being no opportunity to separate into different lanes according to speed and mode of operation, all vehicles are compelled to take the speed of the slowest. The automobile must trail behind the street car, the street car behind the heavy motor truck, and the heavy motor truck behind the team. Where there are three parallel narrow streets with mixed traffic as above, great relief can be secured by confining street-car operation to one street and reserving another primarily for the slow-moving trucks and teams, and the third for the faster-moving motor cars. Similarly, if there are but two such parallel routes, the assignment of one primarily for street-car operation will give considerable relief.

Except on a wide thoroughfare where the street railway tracks and road-bed are separated from the paved roadway by curb or parked strip, a heavy automobile traffic combined with a heavy street-car traffic multiplies interruptions both for the automobiles and for the street cars. This makes it desirable where feasible in laying out a complete traffic and transit plan to provide alternate street-car and automobile routes.

To achieve the best results, the character of given streets must be related to the character of the district they serve—industrial, commercial, residential.

Arrangement of Traffic Arteries

Through traffic of all kinds should be confined to main thoroughfares while traversing residence districts and outlying areas, and these main thoroughfares should be so arranged that they will form natural boundaries to homogeneous districts, as residential areas, large enough to support neighborhood facilities such as stores, schools and recreation places. This regulation of traffic will be difficult of strict enforcement unless the minor streets of the residence district have been so planned as to discourage rather than invite through traffic.

In laying out the minor streets in the unbuilt areas, the number of intersections with or crossing the main thoroughfare should be minimized. Every such crossing is a danger point. Both speed and safety will be gained by combining the traffic of a number of such minor streets at a single crossing. Such a layout will have the very great additional advantage of keeping traffic off the minor residence streets by making access to them less direct and inviting, and this will reduce accidents, especially to children.

In some large cities most of the heavy truck-

ing between terminals and between the terminals and the markets or warehouses must cross through the office or shopping center, thus intensifying the interruptions and dangers usual in that already congested area. While it is seldom feasible to effect a radical rearrangement of misplaced activities and functions, opportunities sometimes arise in connection with extensive reconstruction projects to secure a relocation of freight terminals, produce markets or warehouse districts that will afford great traffic relief.

Too often, expensive bridges, viaducts or vehicular tunnels are built without sufficient attention being given to the approaches that are to carry traffic to and from them. By this failure the effective capacity of such a structure is often reduced by fully fifty per cent. The approach to an important bridge head should sometimes be carried a long distance back from the bridge and should be of such ample width and so free from cross-traffic interference that it can carry without congestion the maximum traffic that the bridge itself is designed to accommodate.

Traffic dangers and difficulties are greatly increased by a haphazard spotting of industries and stores throughout the housing areas. Zoning regulations, establishing separate store centers and industrial districts, and maintaining a proper ratio between the areas set aside for industry and the near-by areas reserved for housing, can do much to render possible the laying out of an adequate traffic system and prevent a haphazard development in existing residence districts that will create traffic dangers and difficulties for the future.

By-Passes and Belt Highways

Often traffic congestion is created not so much by the vehicles of persons who have business *in* the congested district as by the vehicles of those whose business or pleasure takes them through the congested district. In such cases the opening of convenient by-passes routing traffic around the congested district will unquestionably give relief. There are many cities where good cross-town or circumferential routes are so scarce that it is usually easier to go into the center and out again than to attempt to go directly from one near-by section to another.

The same principle of by-passing congested centers should be applied to the laying out of a system of state and national highways. While such highways normally pass through the most congested parts of the communities little and big along their routes, its seems reasonable that where feasible the motorist should be given the alternative of passing around the community on a by-pass route. Every large city should have a belt line traffic way entirely outside of its built-up area connecting all the main radial highways entering the city and making it possible for all through traffic to avoid all built-up urban areas.

Signs, Signals and Pavement Markings for Highway Safety

(From the Report of the Committee on Construction and Engineering)

PROPER signs and signals are essential to the safe movement of traffic on any street or highway. They should therefore be erected when the same is opened or improved and the cost should be included as an item of the construction cost. This applies to three general classes of signs:

1. Cautionary or stop signs and signals at danger points
2. Direction and distance signs at important junctions and intersections
3. Traffic-control signs to indicate special traffic rules and regulations, such as speed limits, school zones, one-way streets and the like

Signs Should Be Uniform and Simple

Signs should be uniform for a given purpose throughout the United States. At present there is a wide variety of signs for the same purpose, both those placed by the authorities of different states and those placed officially by motor clubs or advertisers. Standardization of signs cannot therefore be accomplished in a day. It can, however, be greatly facilitated if the United States Bureau of Public Roads, as the Committee is informed it contemplates doing, adopts the practice of placing signs on Federal-aid roads hereafter constructed as a part of the construction of the road, and at the same time as a separate Federal-aid project places the necessary signs on Federal-aid roads already built and such roads not yet built as it has been determined will be improved on their present locations. It can be assumed that the Federal-aid signs, if

placed, will be uniform in every state and will point the way to state and county highway authorities to follow the same standards.

All signs should be simple, with the least amount of wording necessary to make them readily understood, depending mainly on distinctive shapes, symbols and colors. They should be entirely free from advertising, and advertising signs should not be permitted on the highway right of way. Motor clubs and other responsible organizations should, however, be permitted to place standard signs, subject to the approval of the proper authorities, if not placed by the authorities themselves.

Colors for Signs and Signals

The American Engineering Standards Committee has for some time, through one of its sectional committees, been studying the adoption of a standard code of colors for signs and signals. Your Committee has had the benefit of conference with members of that committee and has found the views of the two committees substantially in harmony, except that the preliminary report of the sectional standards committee advocated three colors only. Believing that a special designation for cross-roads is desirable, your Committee recommends the following code:

For luminous signs and signals the following color indications are recommended, and these colors should not be used for any other purpose:

Red to indicate "Stop"
Green to indicate "Proceed"
Yellow to indicate "Caution," as at curves
Purple or some other color as a special cautionary indication at cross-roads

Non-luminous signs and signals should follow the same color scheme, as follows:

Red background, white letters or symbols, to indicate "Stop"
Green background, white letters or symbols, to indicate "Proceed"
Yellow background, black letters or symbols, to indicate "Caution"
Purple background, white letters or symbols, to indicate "Cross-Roads"
Distance and direction signs should be black and white

Signs for Intersections, Curves, Grades, Etc.

Cross-roads, which more definitely affect other vehicles than do curves, grades and other points where caution is required, merit a distinctive color rather than yellow. The recommendation, however, does not conflict with the placing of a yellow sign at cross-roads if individual state departments deem that preferable.

Besides highway intersections, the principal danger points on the highway calling for cautionary signs include sharp curves, steep descending grades and narrow bridges or places in the roadway. These should be conspicuously marked with yellow cautionary signs which warn not only of the danger but of the specific kind of danger. The through-traffic highway protected with boulevard stops calls for a red sign to indicate the requirement of a full stop before entering or crossing such a highway. Railroad crossings require special protection.

While the Federal-aid, state and county systems of improved highways will perhaps ultimately embrace all highways carrying much traffic, there are at present many unimproved highways with good natural surfaces which carry a considerable amount of travel, and over large parts of which high speeds can safely be maintained. Such highways may lead suddenly to dangerously steep descending grades, sharp curves or rough spots. Where these dangers are not marked by the public authorities, automobile clubs or other agencies can perform a useful service by placing signs at the chief danger points on such highways.

Direction and Distance Signs

No road can be considered satisfactorily equipped with signs unless it has direction and distance signs containing sufficient information in legible form to permit a traveler to go anywhere he desires without the aid of maps or keys. To this end, black and white signboards of adequate size should be placed at every cross-road and junction, setting forth clearly the information as to direction and distance.

Pavement Markings

The Committee has considered carefully the extent to which white center lines should be marked on rural highways and streets. It believes that the white center line should be confined to those points where it is unsafe, and in a number of states illegal, to be on the left-hand side of the road; namely, on curves, at and near hillcrests, at irregular intersections, at railroad crossings, and possibly at a few other points. If confined to those points, the white line acts as a positive warning to motorists not to cross it or be on the wrong side of it. The warning effect is lost if the line is used on straight sections, and therefore it should not be so used. Black center lines, however, whether construction joints in the case of concrete highways built in two longi-

tudinal sections, or lines painted on pavements of a character that will permit it, are effective as a guide in night driving and at all times in keeping each driver on his own side of the road when passing another car, and are recommended as not conflicting with the use of the white line.

Two-lane rural highways, therefore, should be marked with a white center line on curves at and near hillcrests and at irregular intersections, but not on straight level sections, except at highway or railroad crossings. The lanes of wider highways and of city streets should be similarly indicated by one or more longitudinal white lines at similar points.

Transverse pavement markings are desirable to supplement the work of signs. Pedestrian lanes should be marked across the pavement at busy intersections. The use of transverse markings in the vicinity of railroad crossings has already been indicated. They can also be used effectively to caution or instruct drivers approaching intersections or other hazards. Parallel lines to indicate individual parking spaces economize the total space where oblique parking is used.

Speed Limits and Right-of-Way Rules for Motorists

(From the Report of the Committee on Traffic Control)

THE question of speed limits is one to which your Committee has given serious attention. There are three schools of thought on this subject: (1) Some hold that the average motorist is incapable of judging for himself what is a safe speed and that the only way of controlling him is to prescribe absolute speed limits for each section of the street or highway. (2) The second school advocates designation of limits beyond which there is presumption of reckless driving on the part of the operator, whether or not higher maximum limits are prescribed. (3) The third school believes that the law should be directed solely against reckless driving; that it is impossible to fix any safe limit and that the attempt to do so, with the resultant constant violation of, and contempt for, the law, is one of the chief causes of motor accidents.

Your Committee believes that the third plan is right in principle, and recommends a basic control of speed through uniform state laws which lay the emphasis on reckless driving. At the same time it recognizes that speed may be a large factor in street and highway safety, both through the lessened control by the driver of vehicles running at high speed, and the likelihood of more serious consequences in case of accidents; and it also realizes that in fixed speed limits traffic authorities have a yardstick by which to measure, however roughly, violations of the principle of safe driving.

Under present conditions some small municipalities establish limits considerably below those found by more experienced authorities to be safe, and sometimes in direct conflict with the state law, and then proceed to enforce these unreasonable restrictions to the point of persecution of passing motorists. To prevent this, the state law should prohibit any municipality or other local subdivision from establishing any limit lower than 15 miles per hour, provided that municipalities and other political subdivisions of the state should be empowered to fix speed limit zones according to local conditions, but should be required to mark the boundaries of such zones plainly.

Outside of cities and incorporated towns and villages, your Committee believes that the safe allowable speed depends so largely upon the traffic conditions, the character of the highway and other conditions, that there should merely be established a limit beyond which there is presumption of reckless driving. Your Committee would place the limit at 35 miles per hour on the open highway. Under favorable conditions motorists might go faster than this, but in case of accident or court proceedings for any cause it should be incumbent upon the operator to prove affirmatively that he was not driving recklessly. On through traffic highways protected by boulevard stops, generally higher speeds may be permitted than on other highways.

Collisions occur frequently at street and highway intersections, and, in cities, at the outlets of alleys. Some cities have established very low speed limits at such points. When the traffic is light and the view unobstructed, these limits can often be greatly exceeded with safety, and so they are generally little regarded by motorists. At controlled intersec-

tions, also, traffic is frequently conducted at greater speeds. These cases illustrate the importance of stressing the prohibition of reckless driving irrespective of speed. To drive out of a blind alley at as low a speed as six miles per hour, may be to drive recklessly, both on account of pedestrians and on account of other motor vehicles. Driving into or across an important thoroughfare from a secondary street or highway without observing the traffic in each direction, taking advantage of the rule which in most localities gives the right of way to the vehicle on the right, is driving recklessly and should be dealt with accordingly.

On highways of heavy travel, particularly those of heavy travel in each direction, it is obvious that one prolific source of danger can be eliminated if all of the vehicles in one direction move at the same rate of speed and there is no overtaking. The excessively slow vehicle on such a highway which impels all drivers behind it to overtake it may be as serious a menace to traffic in the opposite direction as the speed maniac who wants to overtake all others. Your Committee doubts the feasibility of attempting by legislation to compel motorists using heavily traveled highways to maintain the prevailing speed on the highway, but believes efforts should be made to educate the individual motorist to do this for the safety and comfort of his fellow motorist.

Right-of-Way Rules at Intersections

Designation of through-traffic highways, with the requirement that all vehicles entering or crossing the same must first come to a full stop, has the great advantage that it speeds up the travel on the major highways and so increases their capacity. A disadvantage is that, unless such through-traffic highways or boulevards are equipped with block signals, it is dangerous to enter or cross them within a reasonable time and dangerous for a pedestrian to cross at any time. Another disadvantage is that, unless these boulevards are adequately marked, strangers are likely not to recognize them.

The designation of boulevards with boulevard stops should be confined in any city or district to a few arterial ways carrying heavy traffic a large part of the time. The boulevard plan has failed in some cities because too many streets have been so designated and because they have been insufficiently marked. It follows that warning signs indicating such boulevards should be placed on all intersecting streets and highways, and your Committee understands that the Committee on Construction and Engineering will recommend that such signs be red, to demand a full stop before proceeding.

At all other intersections the vehicle approaching from the right should be given the right of way. The law should be so worded, however, as to indicate that the car approaching from the left shall be required to *give* way to the car approaching from the right rather than that the car approaching from the right may *take* the right of way. The law should also make it clear that the rule applies only when the two vehicles traveling at a reasonable speed would reach the intersection at approximately the same time. It should not authorize the vehicle from the right to make a sudden dash for the crossing.

An objection often made to this right-of-way rule is that motorists conforming to the letter of the law dash out of secondary and obscure highways at unexpected points, jeopardizing and frequently colliding with vehicles proceeding along the main thoroughfare. This, as previously pointed out, should be regarded as reckless driving and punished as such. Education to personal responsibility, however, is perhaps the only complete remedy for it. No motorist should rely on a technical right if to do so will endanger others.

Overtaking Other Cars

One of the most serious sources of danger on the public highways is the motorist who undertakes to pass another vehicle going in the same direction regardless of whether he has a clear view ahead, taking it for granted that the way will open up for him to get back into line if he suddenly meets a car coming from the opposite direction. There should be an absolute prohibition against the overtaking of other cars on sharp curves, at approaches to hillcrests, at highway intersections, railroad tracks, or at any point where the operator of the overtaking car has not a clear view and space ahead sufficient to assure that he can get back to the right side of the road before any vehicle coming from the opposite direction can possibly reach him.

The prevailing rule that a vehicle may pass another moving in the same general direction only on the left-hand side of the overtaken vehicle is a necessary rule to prevent sudden swerving of the overtaken car into the path of the other, as is also the rule that due warning should be given of the approach of the overtaking car. This rule naturally does not apply in streets carrying two or more lines of

traffic in the same direction. Here each line is a thing unto itself, and the motorist is conforming to the reasonable requirements for safety if he maintains a proper distance between himself and the vehicle ahead. In such cases he should not turn out of his line of traffic in either direction without exercising due care that he will not foul other lines of traffic. Where traffic is light, overtaking on the right, even on wide streets, should be prohibited and will be automatically lessened if motorists traveling at less than the safe and proper speed under the conditions will keep to the right as far as possible.

An overtaken car should not increase its speed while being overtaken. Even at points where overtaking is unlawful, to attempt to shut out the offending car when it is alongside is merely to imperil the law-abiding motorist coming from the opposite direction. On the other hand, the operator of an overtaking car should use care not to crowd too closely in front of the car being overtaken.

Where street cars operate on the traveled portion of the highway they should be overtaken on the right wherever practicable. Street cars which have stopped to discharge or receive passengers should not be passed by motor vehicles moving in the same direction without due caution. When approaching any street car which has so stopped, unless it can be passed at a distance of at least 8 feet and at a rate of speed not exceeding 12 miles per hour, the motorist following should come to a full stop at least 8 feet from the rear of the street car and proceed only after all passengers who are getting on and off are in safety.

IN MOST CASES ACCIDENTS AND CASUALTIES ARE AVOIDABLE

Carelessness, indifference, thoughtlessness and recklessness cause not only the pain and suffering of the victim, but also untold heartaches and mental anguish to survivors, who must carry the burden through life. Reports of casualties are such common headlines in the daily press that they fail to make proper impression on us. The horror of the untimely death, either as to the victim or as to the perpetrator, is not realized until it strikes into your own home. Don't wait until this happens before you wake up to the realization of your duty to yourself and your fellow man. Support this movement by your full cooperation as well as with your purse!—Memphis Chamber of Commerce Journal.

Paving Design and Maintenance as Affected by Track Construction

By Julius Adler

Deputy Chief, Philadelphia Bureau of Highways

THE successful construction and maintenance of street paving in railway track areas is one of the two or three most difficult and important problems still confronting municipal paving engineers. Upon analysis, it is found that there are three fairly distinct phases of the problem which must be considered:

1. The design and construction of track which will economically serve the requirements of transportation for the railroad company and at the same time create the least practicable disturbance of the adjoining street pavement, whatever its type.

2. The design and construction of a type of pavement best adapted to resist the disturbance from unavoidable movement of the rails.

3. The design of a type of pavement best calculated to permit of necessary repairs and replacement of rails when they become necessary, as well as of satisfactory restoration of the disturbed pavement areas.

The following discussion is based upon this outline of the problem, with a view to summarizing past experience and suggesting future possible developments, rather than with a hope of arriving at immediate conclusions.

Design and Construction of Track

No one can question the earnest effort which has been made by street railway engineers to improve their track structures to the point of rendering economic service for the transportation company. With increasing size and weight of cars, rail weights have been increased, better designs adopted, and old forms of rails discarded. Changes made with a view to improving and strengthening joint construction have been unceasing.

Fortunately, there are very few operating companies that would persist in running cars over tracks so badly worn and run-down that this condition in itself would forbid the maintenance of a satisfactory pavement in the track area. If any criticism can be made by the municipal engineer of the efforts of the railway engineer, it is that consideration has been given in many cases only to the economics of railway transportation and to a very limited extent to the requirements of paving maintenance. It is true that improved form of rail, increased weight of rail, and stronger joints, besides being a direct benefit in the operation of cars, indirectly improve the paving situation. It does not follow in all cases, however, that improvements along these lines will be sufficient to meet the requirements of successful paving. As a matter of general practice, the railway engineer has stood out for flexibility in track construction; whereas the municipal engineer knows that there is no type of street paving in common use which is so flexible as to be able to follow, without ultimate disintegration, the wave-like motion of a weak track structure, deflecting under its loading. On this basis, in order that the track may cause the least practicable disturbance of the adjoining pavement, it must not only be properly designed as to rails, joints and ties, but it must also be supported in such manner that the amount of movement of the track structure is definitely limited.

The specifications recently prepared by a Committee of the American Society for Municipal Improvements recognizes the possible use of a concrete slab under the ties, or of rock, slag, gravel, cinder or other ballast. Evidently the degree of support offered varies widely between the extremes of these materials. The great difference in cost between these several forms of construction is likewise a very important matter. Hence, the interpretation of these specifications and their proper translation into actual track construction are matters requiring considerable knowledge and experience as well as a broad-minded attitude of recognition by both the railway company and the municipality of the dual requirements for railway and paving purposes.

At this point reference should be made to the "solid concrete construction" also covered by the A. S. M. I. specification. This type, providing for a solid slab of concrete from a designated surface beneath the ties to another surface above the top of the ties, is evidently the strongest form of construction specified. On the face of it, however, it is open to the objection of extreme rigidity, which is believed to be undesirable for economic track maintenance, and it further leads to the serious

disturbance, if not the total destruction, of the track foundation when the inevitable rail replacement becomes necessary.

Design and Construction of Pavement for Track Area

A perusal of the great amount of interesting data collected by the A. S. M. I. Committee a few years ago upon current practice in the matter of paving track areas, discloses some inconsistencies, but a general tendency on the part of the municipal engineer to select none but the most durable types of pavement for meeting the requirements of service at this location. The amount of credit due for this broad-minded attitude may, of course, depend very much upon whether the railroad company carries the obligation of laying and maintaining the paving in the track area or whether the municipality performs this function.

It is appropriate at this point to mention the fact that the city of Philadelphia is one of the relatively few large cities in which the traction company pays into the city treasury a flat sum each year and the city assumes the entire obligation of constructing and maintaining the pavement in the track area; and that under these conditions, the city has learned that it is good economy to lay the most substantial pavement possible between, and adjacent to, the rails, without particular regard to the first cost.

The evidence in the reports of various cities to the Committee of the A. S. M. I. was overwhelmingly in favor of the use of some form of block pavement adjacent to the rails, and, of the several types of block pavement, granite block in some form met with most favor. There can be no question of the necessity for as tough and durable a material as possible at this location, and in view of the ever present possibility of disturbance of the pavement and of access of water, the material should be of such character that it will not readily disintegrate or deteriorate as a result of the presence or action of either water or frost. Obviously, stone block and vitrified brick most nearly meet these requirements.

For frequent car movements and heavy vehicular traffic, the use of granite blocks adjacent to the rails will undoubtedly prove economical in the long run, regardless of the type of pavement to be laid in the remaining street area. In this connection it is suggested that consideration be given to the use of blocks of larger individual size, with a view to increasing the bearing area and reducing, if possible, the liability to displacement from rail movement. It is planned in Philadelphia, during the coming year, to inaugurate a series of experiments in track and pavement construction, especially at crossings where failures are most numerous and rapid, with the hope of improving the local design at least.

The matter of construction of pavement adjacent to railway tracks can perhaps be covered by the general statement that whatever precautions are taken and regulations prescribed for obtaining a first-class and workmanlike job at other points in the street area, it is doubly necessary to enforce these requirements in the track area. The concrete base mixture should be of a good, plastic consistency so as to be readily worked into the irregular space requiring filling, and careless workmanship which results in pulling the coarse aggregate out of the mixture and segregating these fragments under, and adjacent to, the rails, should not be tolerated.

Header blocks, or runners, when used along the rail, should be paved on the least possible amount of damp mortar, rather than on a thick cushion which may afterwards be displaced as a result of rail movement and access of water, and these blocks should be backed with concrete immediately after being paved in, and preferably in time to be bonded with the adjacent concrete.

Design of Pavement from Maintenance Standpoint

Monolithic pavements, including block pavements filled with portland cement grout, give a very strong pavement and frequently a very durable pavement for use in the track area. From a broad standpoint, however, it is believed that this pavement should consist of blocks with joints filled with one of the common forms of plastic joint filler, which in the case of stone block is a mastic composed of asphalt or tar and sand, and in the case of brick, an asphalt cement. This type of pavement combines the durability of the grouted block or other monolithic pavement with apparently somewhat greater ability to withstand slight movement or vibration of the rails; provides much readier access to the track structure for necessary repairs; greatly reduces the destruction of the original pavement when removed for the purpose of repairs; and, finally, permits of a generally more satisfactory restoration. In addition, there is the very practical advantage of being able to return the track pavement area to use by traffic promptly and without undertaking the difficult task of attempting to exclude vehicular traffic from an area on the street which cannot be effectively blocked off, because of its use by car traffic.

This division of the subject, while apparently of less importance than the two preceding ones, exemplifies the necessity for a broad-minded treatment of the general track-paving situation. If, on the one hand, the railway company is expected to make heavy investments in track construction of a type more costly than would probably be required simply for car operation, then the municipal engineer should at least recognize the requirements of the company in track maintenance.

From past experience, it seems useless to expect to lay new track and pavement structures which will develop no defects and can be left undisturbed over a long period of years. For example, from present indications, rail joints will continue to be a problem to the operating company and a frequent cause of breakdowns in the adjacent pavement. The same is true with respect to special work, and particularly right-angle crossings. Under such circumstances it should be the part of wisdom to recognize that, whether immediately or not, maintenance begins after construction ends and if the track pavement is laid only with an eye to the strength or apparent durability of the original construction, it may result in an unnecessary increase in the adverse effects if trouble develops later in the track.

ACKNOWLEDGMENT.—A paper read before the American Society for Municipal Improvements at Boston, Mass.

Preventing Spring Break-ups in Pavements

Methods Employed in Repairing Large and Small Breaks in Macadam and Bituminous Pavements, Described at Highway Conference at Cornell University

By A. W. Brandt

New York State Department of Highways

THE general break-up of highways is an annual occurence. It starts as soon as the frost begins to come out of the ground and continues until the subsoil has thoroughly dried out. As soon as this general spring thaw begins, the state patrolmen, each with only one or two helpers, are sent out to open up the ditches and culverts that are clogged. This work is of the utmost importance, for to leave the water standing in the ditches will inevitably result in a soft and unstable soil, which in the case of the thinner roads will cause break-ups or frost-boils. Little can be done to a frost-boil or a larger break immediately after it occurs. The general practice in New York State is to knock down the humps, fill in the holes, and spread cinders, gravel or No. 1 and 2 crushed stone over the break in order that traffic may be safely carried. These temporary repairs are kept as smooth as possible until the subgrade has dried sufficiently to enable more permanent repairs to be made.

length of time depends upon the character of the weather—whether it is exceptionally rainy or very dry. In the meantime, the field stone for foundation, together with the crushed stone and bituminous materials for the bottom and top courses, is stored at the broken areas.

Repairs to Weak Roads

In the case of a road which has been in a weak condition for some time and which would probably be reconstructed within a year, the repairs are light. They consist in removing the entire broken section to the original subgrade and replacing it with a patch of the same thickness as the original road, which, as a rule, means a bottom course of No. 3 stone, which may or may not be rolled, depending upon the size of the break and whether or not a roller can be operated on it, and, as a top course, either penetration macadam or cold patch. In case a cold-patch top is used, No. 1 stone is first mixed with either asphaltic emulsion or asphaltic cut-back and brought to within 1½ inches of the desired surface. Then the same bituminous material is mixed with No. 1 stone for the surface application. Wherever possible, this course is tamped or rolled. Rolling gives a much more satisfactory job, but there are so many breaks and so many section gangs repairing them, it is obviously impossible to furnish them all with rollers. At present, 3- and 4-ton rollers are used, as they have been found exceptionally satisfactory for this class of work as well as for penetration work on small breaks.

Repairs of Small and Large Breaks

In repairing small breaks on roads which will not be rebuilt for several years, the common practice is to remove the broken section entirely and take out the subgrade to a suffi-

cient depth so that a 6-inch or a 9-inch foundation course of field stone may be used; then two 3-inch courses are placed on top of the foundation and the patch is brought to the proper surface, as in the lighter repairs. This type of repair is costly, as it is necessary to keep the road open to traffic during operations; this permits the removal of but one-half of the broken pavement at a time, and means that its removal, together with the digging out of the old subgrade preparatory to placing the foundation, must be done by hand.

With breaks several hundred feet in length, repairs can be made in a much more economical and efficient manner. Wherever a road which will eventually be rebuilt with concrete has broken in a stretch of 1,000 or more feet and we have sufficient money to finance it, a concrete pavement is placed which will conform with the grades and alignment to be used when the actual reconstruction of the entire road is carried out. Unfortunately, funds are usually so limited that this treatment can be applied only to the most important of the main lines. On all other roads, the necessary repairs are made by the bituminous macadam penetration method. In repairs of this length, it is possible to put in plows, tractors, scrapers, trucks, etc., and remove the bulk of the road by means of machinery, which is far more economical than the hand method. The same general practice of placing the field stone foundation course is followed, providing the road is one which will not be rebuilt for some time. This type of repair has a distinct advantage over the small repairs, in that a large 10-ton roller can be used. These rollers produce a much smoother road, as there will be little or no movement of the foundation course under traffic.

Repairs with Bank-Run Gravel

Another method which has been used with excellent results and is still more economical is the placing of a 9-inch run of bank gravel course entirely over the broken section. The gravel must be of a quality that can be rolled compactly. On top of this may be placed either a 3-inch penetration top or a 3-inch evener course and a penetration top.

There were several breaks ranging in length from a few hundred to as much as 4,000 feet on the Albany-Binghamton main line road in the spring of 1924. As the road throughout almost its entire length was in the country, the retention of the old grade was not essential and it could be raised any desired distance without damage to adjacent property. There were large deposits of a rather shaley gravel adjacent to the road. As soon as the road had become thoroughly dried out, this gravel was drawn on, spread to a depth of about 9 inches, and thoroughly rolled. It was so well compacted and smooth that one could travel over it at a high speed without the least discomfort. Although the exact cost figures of this type of reconstruction are not available, it is felt that it is practically as efficient as, and much cheaper than, taking out the old road and placing a foundation.

It has been estimated that in 1920 more than 166,000 square yards of pavement broken under traffic was restored by departmental forces. These figures do not include ordinary surface or pot-hole patching. This is equivalent to more than 16 miles of 18-foot road. The year 1923 was the worst experienced so far as broken pavements were concerned. There were at least 400,000 square yards of pavement broken under traffic, as a result of the spring break-up, which had to be restored during the summer. This is in addition to approximately 15 miles of contracts for reconstruction after an emergency appropriation had been obtained from the Legislature for that purpose.

Consent of Property Owners to Erection of Business Building

A city ordinance providing that no permit shall be granted for the erection of a business house, if there are more residences than business houses within a radius of 300 feet of the proposed location of such structure, without the consent of three-fourths of the resident property owners owning property within the prescribed area, is unconstitutional and void as an unreasonable and discriminatory exercise of the police power.

In reaching this conclusion in the case of State v. Thomas, 123 Southeastern Reporter, 500, the West Virginia Supreme Court of Appeals said:

"A legal exercise of the police power should operate uniformly upon all persons similarly situated who may be affected thereby. Testing the ordinance by these principles, has it a valid basis? It does not place an absolute restriction on the use of property within residential districts for business structures, but undertakes merely to confer upon three-fourths of the property owners authority to say who shall be granted the privilege. The ordinance would clothe these individuals with the powers of government to refuse the right to one and bestow it upon another; thus denying to the former a legitimate use of his property, not in return for any general benefits resulting to the neighborhood from a strict maintenance of its residential character (this will not be accomplished), but in order simply that the latter may be favored."

LAYING GRANITE BLOCK PAVEMENT IN ELIZABETH, N. J.

Granite Block Pavements with Asphalt Filler for Heavy-Traffic Streets

By Thomas E. Collins
City Engineer, Elizabeth, N. J.

ELIZABETH, N. J., a city of 110,000 inhabitants, is in the metropolitan district of New York, on the Lincoln Highway between New York City and Philadelphia. Because of its location, the main arteries in the city are subject to very heavy traffic. Realizing this condition, we have adopted granite block pavement with asphalt filler as a standard for heavy-traffic streets.

Concrete Foundation and Cushion

The concrete base for this class of pavement is 6 inches thick and is composed of 1 part portland cement, 3 parts sand, and 6 parts trap rock.

In order to facilitate the work, it was found advantageous to store materials used in the concrete base at street intersections. The materials are loaded by automatic machinery into

PUMPING ASPHALT FILLER FROM TRUCK INTO KETTLE

1-ton Ford trucks and by this means are transported and dumped directly into the hopper of the concrete mixer.

The cushion between the concrete base and the granite block pavement is composed of a mixture of 1 part of portland cement and 3 parts of sand.

Granite Block

The granite blocks are obtained from quarries in New England. They are shipped from there on barges to our municipal dock on Staten Island Sound. Upon their arrival, the lighter transfers the blocks from the barge to motor trucks, which haul them to the job and dump them directly on the concrete base. This method eliminates the necessity and inconvenience of piling them along the sidewalks and consequently reduces the cost of the paving.

Asphalt Filler

Previous to 1923, it was the practice to use cement grout filler for the joints. We found, upon investigation, however, that better results could be obtained by using an asphalt filler and hence have adopted this as standard.

During 1923, 32,000 square yards of this class of pavement were laid in Elizabeth, and at that time the asphalt was delivered in barrels. This necessitated the hauling of the asphalt from the plant, removing the barrels on the job, and then cutting the filler into pieces that could be easily lifted into the storage tanks on the work. We found this method not only inefficient but very costly. For that reason we have adopted the scheme of delivering the asphalt in auto tank trucks on the work.

The asphalt filler for granite block pavement is refined from liquid crude asphalt by distillation until the material has been brought to the proper consistency. It is pumped into storage tanks, where it is maintained at a temperature varying from 350° to 375° F. From the storage tank the asphalt filler is pumped through a 4-inch line to auto tank trucks at a temperature varying from 350° to 375° F. The material is transported in trucks to distances up to 25 miles at these temperatures, and it is pumped from the tank trucks to kettles on the work and is then ready for the mixture of sand without any pre-heating. The tank trucks used for transporting the asphalt filler have a capacity of 1,000 gallons and are insulated to maintain the heat of the product while in transit. They are also equipped with air compressors for discharging the material to the contractors' kettles. A quantity of 1,000 gallons is discharged in about 20 minutes.

Removing Excess Filler from Surface

A very important part of this work is to see that all the excess asphalt material is removed from the surface of the blocks, which is accomplished by heating irons in a wagon containing burners. This method is a great improvement over the old method of heating the irons in wood-burning kettles, as it heats them twice as fast.

It is quite necessary to have a sufficient number of men with hot irons so that the material can be pushed into the joints quickly and the excess removed from the top. We found during 1923 that on one street, because of lack of sufficient hot irons, a greater amount of asphalt filler than necessary was left on the surface of the blocks. This excess became very annoying to the business men on the street and it was found necessary to devise some method of removing it. After giving the subject careful consideration, we adopted a scheme of heating the excess material by burners and removing it with hot irons. This proved to be a very efficient, practical and economical method.

REMOVING EXCESS ASPHALT FILLER FROM GRANITE BLOCK PAVEMENT WITH BURNER

Conclusion

After supervising the construction of many thousand yards of granite block pavement with cement grout and asphalt filler, I would recommend the use of asphalt filler for the following reasons:

1. It is the most practical

RUNNING ASPHALT FILLER INTO POINTS OF GRANITE BLOCK PAVEMENT OF EAST JERSEY STREET, ELIZABETH, N. J.

and economical pavement for heavy-traffic streets, especially in large cities in the metropolitan districts.

2. It eliminates noise, which is very objectionable to business houses and residents.

3. Repairs can be more easily and quickly made to necessary openings.

4. When the paving work has been completed, it is possible to open the street for traffic within a few hours, while with grout filler the street must be closed for a period of at least five days.

ACKNOWLEDGMENT.—From a paper read before the American Society for Municipal Improvements at Boston, Mass.

Professional Short Courses in Highway Engineering and Transport

DURING January, February and March the Department of Civil Engineering of the University of Michigan will continue the series of short courses for mature men engaged in the practice of highway engineering and highway transport. The courses are so planned that any one of them may be taken independently. As will be seen from the following schedule, there will be five of these two-week periods during the first three months of 1925:

JANUARY 5 TO 16, 1925

C. E. 73. Brick, Cement-Concrete, Stone Block and Wood Block Pavements.—Professor Morrison.
C. E. 76. Highway Engineering Theory and Design.—Professor Swinton.
C. E. 80. Interrelationship of Highway, Railway and Waterway Transport.—Professors Riggs and Worley.

JANUARY 19 TO 30, 1925

C. E. 68. Bituminous Surface Treatments; Bituminous Macadam, Bituminous Concrete, and Sheet Asphalt Pavements.—Professor Blanchard.
C. E. 84. Highway Transport Management.—Professor Swinton.

FEBRUARY 2 TO 13, 1925

C. E. 69. Highway Laboratory Research.—Professor Morrison.
C. E. 70. Highway Structures.—Professors Gram and Cissel.
M. E. 40. Mechanism, Operation and Maintenance of Motor Trucks, Tractors and Trailers.—Professor Lay.

FEBRUARY 16 TO 19, 1925

Eleventh Annual States Conference on Highway Engineering at the University of Michigan.

FEBRUARY 23 TO MARCH 6, 1925

C. E. 71. Highway Specifications, Contracts and Jurisprudence.—Professor Riggs.
C. E. 82. Highway Transport Costs and Record Systems.—Professor Swinton.

MARCH 9 TO 20, 1925

C. E. 76. Highway Engineering Theory and Design.—Professor Swinton.
C. E. 78. Grading Machinery and Operations, Drainage Systems, and Earth and Sand-Clay Roads.—Professor Morrison.
C. E. 79. Highway Transport Legislation.—Professor Blanchard.
C. E. 85. Traffic Engineering and Its Applications to Street Design and City Planning.—Professor Blanchard.

The University of Michigan is believed to be the only educational institutional offering courses of this kind. Detailed information can be secured from Arthur H. Blanchard, Professor of Highway Engineering and Highway Transport, at Ann Arbor.

A Commendable Meter-Reading and Billing System

By Stephen B. Story

Director, Bureau of Municipal Research, Rochester, N. Y.

THERE is little or nothing in the field of water-works business which is at all spectacular. The work required to get into the treasury money in compensation for water delivered is certainly as uninteresting to the average person as we can imagine anything to be. It is, however, one of the most important functions which water-works men have to perform, for without the wherewithal to pay for materials and labor consumed in supplying water, water-works systems would cease to exist. If effectiveness, simplicity and convenience to ratepayers are desirable in the money-collection work of water departments and companies, a study of methods employed can easily produce results.

It is the purpose of this article to present in a very brief way some of the features of the meter-reading and billing system of the Water Bureau of the city of Rochester. The city has at present approximately 54,000 consumers who obtain water from the domestic supply. The water used by consumers is entirely metered. There are 1,300 meters on the services of large consumers. Meters on the 52,800 smaller services are read quarterly, and on the larger services are read monthly.

It was formerly the practice to read all meters in the city in a group once each quarter. From 41 to 42 working days were required to complete the work. Bills were then prepared and the meter readers all turned bill distributors and handed out the bills. Distribution required eleven days. The water bills were for water supplied during the previous quarter.

There is in force in Rochester a system of interest charges which are applied at the rate of one cent per month upon all bills which are not paid in the month in which they become due. This acts as an inducement to speed up payment of water bills. The natural inclination of the consumer is to pay his water bill during the last few days of the month in which his bill is due. About two-thirds of the bills are paid in the month they become due. Seventy per cent of this two-thirds are paid via mail, and thirty per cent are paid by the consumers in person at the office of the City Treasurer. The number of bills paid in person is about 11,000. On the last few days in which bills were due it was customary for long queues of people to form while waiting their turn to pay their water bills. Under the old system, mail from about 20,000 accounts deluged the Treasurer's office simultaneously with the rush at the Cashier's window. Work in the Treasurer's office other than that pertaining to water revenue collection was at a standstill, and it was usually several weeks before that office recovered from the load imposed upon it by the method of quarterly collections.

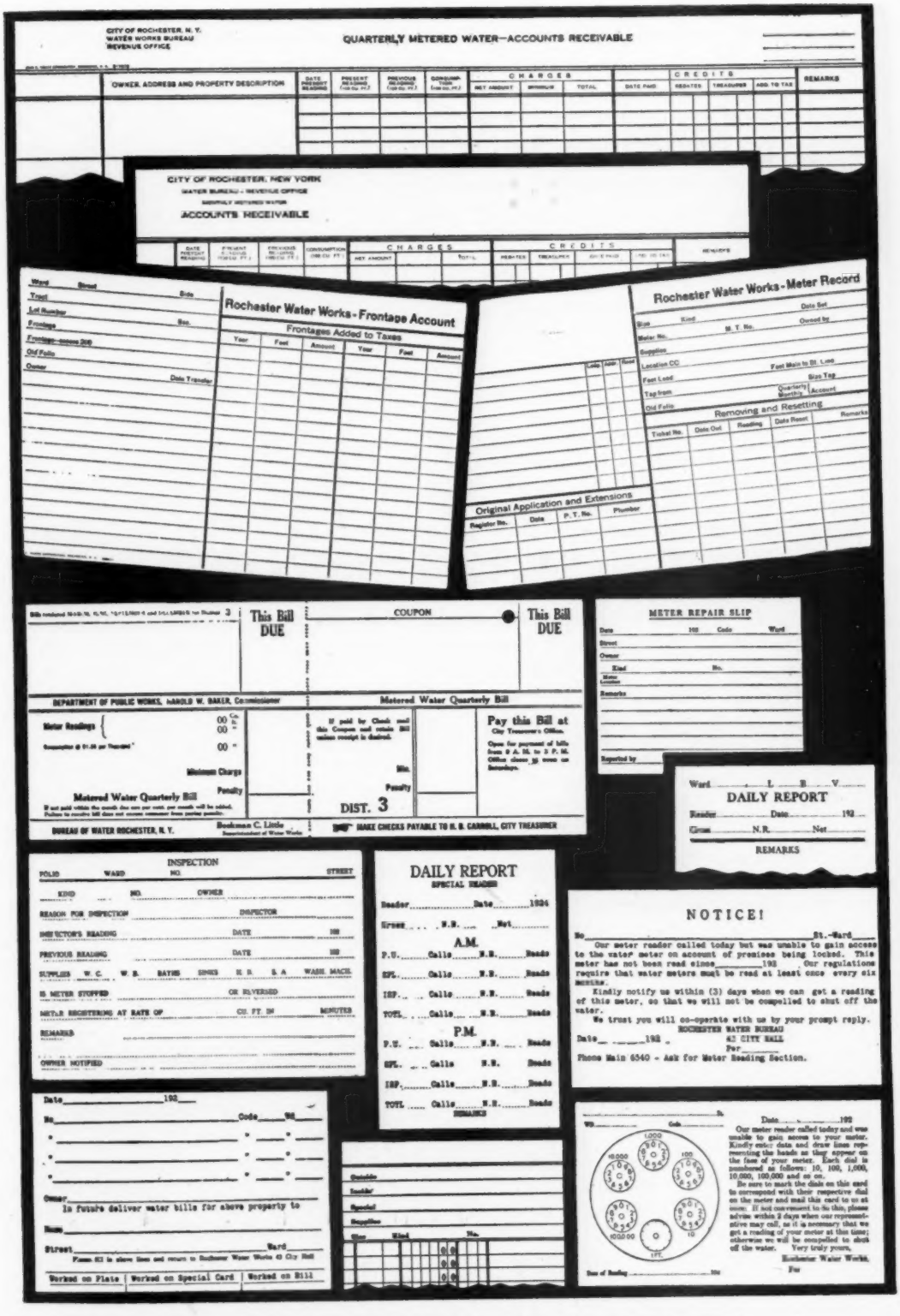
New System Adopted

On January 1, 1920, the Rochester Water Bureau put into effect a new system for reading its meters and billing its consumers.

The city is divided into three districts of approximately equal size as regards the number of meters in each district. This divides the meters so that there are about 17,000 in each district. A month is required to read a district's meters. In addition to this quota the monthly readings have to be taken on the monthly accounts. Inasmuch as the ward division is used in many of the descriptive systems in the books of the various city departments, it was felt that ward designations should be retained, and wards are assigned to districts in their entirety. A work program or schedule for the continuous reading and monthly billing plan was prepared and put into effect. It has been carefully adhered to and the work has not been permitted to lag behind it.

The meter reading is done by one group of meter readers, who read meters continuously. As soon as one section is completed on schedule, another section is started. Ten readers are required and 95 readings a day is figured to be a day's quota. This quota means 95 calls. The regular reader gets about 92 per cent of the readings. A special reader covering the non-read consumers gets 3 per cent more. The non-read meters are but 5 per cent of the whole number. Bills are distributed by men who do nothing else. Four distributors are required.

As soon as a day's readings are turned in to the meter-reading division, the read cards


CITY OF ROCHESTER, N. Y.
WATER WORKS BUREAU
REVENUE OFFICE
QUARTERLY METERED WATER—ACCOUNTS RECEIVABLE
OWNER, ADDRESS AND PROPERTY DESCRIPTION
CHARGES
CREDITS
REMARKS
CITY OF ROCHESTER, NEW YORK
WATER BUREAU - REVENUE OFFICE
ACCOUNTS RECEIVABLE
Rochester Water Works - Frontage Account
Frontages Added to Taxes
Rochester Water Works - Meter Record
Removing and Resetting
Original Application and Extensions
This Bill DUE
COUPON
This Bill DUE
DEPARTMENT OF PUBLIC WORKS, HAROLD W. BAKER, Commissioner
Metered Water Quarterly Bill
Pay this Bill at
City Treasurer's Office.
DIST. 3
BUREAU OF WATER ROCHESTER, N. Y.
Rockman C. Little
MAKE CHECKS PAYABLE TO H. B. CAMMILL, CITY TREASURER
METER REPAIR SLIP
DAILY REPORT
Reader
Date
REMARKS
INSPECTION
POLE WARD NO. STREET
REASON FOR INSPECTION
INSPECTOR'S READING
PREVIOUS READING
IS METER STOPPED
METER REGISTERING AT RATE OF
REMARKS
OWNER NOTIFIED
DAILY REPORT
SPECIAL HEADER
A.M.
P.M.
Calls
N.B.
Reads
REMARKS
NOTICE!
Our meter reader called today but was unable to gain access to the water meter on account of premises being locked. This meter has not been read since
. Our regulations require that water meters must be read at least once every six months.
Kindly notify us within (3) days when we can get a reading of this meter, so that we will not be compelled to shut off the water.
We trust you will co-operate with us by your prompt reply.
ROCHESTER WATER BUREAU
42 CITY HALL
Phone Main 6540 - Ask for Meter Reading Section.
In future deliver water bills for above property to
Worked on Plate
Worked on Special Card
Worked on Bill
Our meter reader called today and was unable to gain access to your meter. Kindly enter data and draw lines representing the hands as they appear on the face of your meter. Each dial is numbered as follows: 10, 100, 1,000, 10,000, 100,000 and so on.
Be sure to mark the dials on this card to correspond with their respective dial on the meter and mail this card to us at once. If not convenient to do this, please advise within 2 days when our representative may call, as it is necessary that we get a reading of your meter at this time; otherwise we will be compelled to shut off the water. Very truly yours,
Rochester Water Works.

A SET OF FORMS USED BY THE ROCHESTER WATER DEPARTMENT

are checked and sorted in order of folio or in order of street and house numbers. As soon as the readings for one ward are accumulated, the billing process is started. The time required to read the largest ward is six and one-half days. After the date of reading, previous reading and present reading and the consumption are stamped on the bills by an adding machine, they are run through a specially designed "pricing" machine which multiplies the consumption by the rate and stamp the amount upon the bill. Three different-colored papers are used for the three quarterly bills. The bills are then sent to the accounting division, where they are checked up and postings made by machine to the account records.

The account ledgers are of loose-leaf type, and carbon copies of entries are made for the Comptroller and Treasurer. Accounts are entered in order of streets and house numbers, or, in other words, the order of reading meters as represented by a reader's progress along a street is the order in which the account entries are made on the ledger pages. An Addressograph is used wherever possible in making out read cards, bills and ledger sheets. Multigraph equipment enables the bureau to print all its bills, and incidentally most of the miscellaneous forms for the Department of Public Works.

Forms are used to record all transactions concerning water consumers' accounts. As soon as the necessary entries are made upon the ledgers, the bills are sent to the reading division for re-sorting and distribution. The distribution quota is 300 bills per day.

Advantages

On the first day of each month a group of water bills representing one-third of the city's consumers is due. The effect of this continuous reading and billing plan is as follows:

On the meter-reading divisions

It eliminates the peak loads, which formerly occurred quarterly.

It keeps meter readers steadily at work doing one thing—reading meters.

It enables better planning and control of work of reading and billing.

On the accounting division

It delivers the bills to the accounting office in a fairly steady stream.

It spreads complaints and high-bill discussions evenly over the entire year.

It enables the work to be schedulized and makes unnecessary the accumulation of bills for a period longer than that required to post the consumers' records and make the necessary proofs.

On the meter repair division

Reports of impaired meters are turned in on meter-reading cards. These cards bear notations as to the condition of meters. The quarterly system made peaks in the meter repair work. By continuous reading, repair work comes to the meter repair division at a uniform rate.

On the Treasurer's office

Quarterly peak loads are reduced 66⅔ per cent.

Clerks are employed continuously in the opening of mail and the collection of water revenues.

Better organization is effected in the office force, and other work is possible without interruption.

Water-rent payments are made, in the aggregate, two months earlier than previously. The interest gained thereby is about $6,000 annually.

ACKNOWLEDGMENT.—A paper read before the New England Water Works Association, at Rochester, N. Y.

Use of Tear Gas by Police

ANOTHER war gas turned to peace uses of the utmost importance is a tear gas. As in all other cases, this tear gas in its ordinary state is not a gas; it is a solid. The gas used generally by the Army and civilian organizations is chloracetophenone, a beautiful, white, crystalline solid. It is mixed with smokeless powder or other burning mixture and driven off as a smoke, or dissolved in benzene and carbon tetrachloride and driven off as a spray. In either way it is tremendously effective.

No human being has been found who will stand up before a heavy concentration of it. The one who feels it strike his eyes will forget everything but the desire to get out of it. He may know perfectly by practice and principle that no injury will result; he may know that within an hour or less his eyes will be cleared and no inconvenience suffered. He may know this as the result of dozens of trials, and yet the gas affects him just as powerfully after a score of trials as on the first occasion.

It is used in policemen's clubs, in bombs, grenades, in bank vaults, storehouses, and even dwellings. It furnishes the police with a means of getting criminals out of barricaded buildings without loss of life; it furnishes a means of quelling riots in jails and penitentiaries and preventing escapes such as has not been offered by any other substance. It is one of the most benign substances used to control unruly gatherings, no matter what their nature. Like chlorine, it is a boon to mankind and particularly to those who are charged with the thankless task of upholding the law in criminal cases in civil life generally.

—From the 1924 Report of the Chief of Chemical Warfare Service, issued December, 1924.

Timber Structures on Washington State Highways

This Type of Construction Confined to Temporary Structures, Crossings and Renewal Work on Approaches for Older Bridges

By George W. McCoy
Office Engineer, State Highway Department, Olympia, Wash.

THE use of timber structures in the state of Washington is at present confined to temporary structures, crossings on secondary roads, and renewal work on approaches and floors for older bridges on primary roads. There are a few timber trusses, but the Department is not building them now, except where a light loading and narrow roadway is justified and the lack of funds precludes a permanent structure.

A minimum width of 20 feet has been adopted for roadways on primary highway bridges. A timber trussed bridge carrying this roadway width and a modern class "A" loading is as expensive to build as a steel bridge and consequently less economical on account of its shorter life.

Floor Replacement a Factor

The inconvenience of periodic replacement in timber floors and trestles is a factor which is not usually considered in their selection. With the continual increase in traffic, this cannot be overlooked on primary highways. It has been found in Washington that the life of a timber floor on a heavily traveled road is usually four to five years. The present worth when figured over a long period of years is about the same as that of the permanent floor. This fact, coupled with the continual annoyance to the public of replacing the timber floors periodically, has led to the adoption of the construction of the most permanent floor possible. It is believed that the timber structure should not be built on main highways except to renew the approaches and floors of existing bridges which are too good to be entirely replaced.

It is believed, however, that there is a place for timber bridges on secondary roads. on roads which are now being used as main highways but which will eventually be abandoned for better locations, or on streams which are hard to control, such as delta

TIMBER BRIDGE ACROSS THE PALIX RIVER, A TIDAL STREAM EMPTYING INTO WILLAPA BAY, WASHINGTON

This river is a navigable stream used by occasional tugboats and dredges. The bridge consists of one 64-foot timber truss span which is fixed, one 36-foot timber bascule draw span, and pile bent trestle approaches. The draw span is operated by hand, two men being required to operate it. The draw is more a matter of preparedness than anything else, and it is necessary to operate it only once or twice a month, at which time the crew of the boat passing through the bridge handles the operation

streams which are continually changing their courses and where a permanent structure might have to be removed during its life.

Treatment of Timber

The question as to whether timber should be treated or not treated and, if treated, what process should be used, is entirely dependent on the desired life of the structure. A well-applied brush treatment of two coats of creosote of the proper specifications will increase the life of timber to at least double that of untreated timber, and in many cases more. A standard pressure treatment with a minimum of 8 to 10 pounds of creosote per cubic foot will increase the life of timber to from four to six times that of untreated timber.

The increased cost of construction for brush treatment is ordinarily about 15 per cent, while that of pressure treatment is from 30 to 50 per cent. Either process is therefore economy, and in any timber structure the desired life of which is more than six or eight years, one of these processes should be used. State specifications call for at least one coat of hot creosote for all timber structures at points of contact, except the actual floor planks before assembly. Mud-sills or columns near or in contact with the earth should also be treated with creosote.

Money invested in treating timber is very well spent in any but the most temporary work. It is no doubt a much better preservative for timber than lead paints, and is not unpleasing in appearance.

Use in Salt Water

Another use for timber structures is near salt water, where available funds or other conditions do not justify the use of reinforced concrete. Steel structures in such cases are hard to maintain and, if not watched very closely, will deteriorate very rapidly—much more so than creosoted timber.

Summary

It is believed that on main highways where economy is sought over a long period of years with as small amount of inconvenience to the traveling public as possible, the use of timber in highway structures should be avoided if possible.

On secondary highways, in a great many instances and in other cases mentioned, timber structures show true economy.

Wherever timber is used, except in strictly temporary work, the use of treated timber will show marked economy.

ACKNOWLEDGMENT.—From an address delivered at the annual convention of the Western Association of State Highway Officials, Yellowstone National Park, as reported in the *Pacific Street and Road Builder*. Illustration by courtesy of the author.

The Need for Storage Reservoirs

By R. E. McDonnell

Burns & McDonnell Engineering Company, Kansas City, Mo.

A SUPERINTENDENT is treading on thin ice by putting all his dependence on the safety of pumps, pipe lines and equipment. They are always subject to breakdown, floods and unusual accidents. One superintendent's excuse for not going to a water-works convention was that he was afraid to leave home for fear of a breakdown. I'm wondering if that community would have slept peacefully at night if they had known the small margin of safety with which their lives and property were protected. The right kind of a water-works official is fully justified in making known the needs of the water department and taking into his confidence the public, not by written reports, for they are seldom read, but by warnings before civic organizations and the public press regarding the needs of the water department.

I recall clearly the disaster that happened at Berkeley, Calif., about a year ago. There a city of about 60,000 suffered a loss of twelve million dollars, and in three hours 1,200 of the finest homes in the city were totally destroyed. The circumstances surrounding that loss were unusual. The city had employed a City Manager who had previously had some water-works experience in another state. After being on the job less than one month, he saw the need of larger reservoir capacity and larger feeder mains, and reported his recommendations for a survey of the water needs. The City Council replied that his advice was not new and that such matters had been discussed for years. The Manager insisted that a report should be made, but unfortunately their disastrous fire occurred upon the very day our engineers arrived to begin the surveys. Within an hour after the fire started, using twenty-five fire streams, the reserve reservoir

was exhausted. Direct pressure through small-diameter mains with their high friction loss produced ineffectual streams.

Proper Size of Reserve Reservoir

The size of a reserve reservoir supply as recommended by most boards of underwriters is three and one-half times the maximum daily consumption. Some cities have far greater volume than this. One Western town, Flagstaff, Ariz., having fifty times its daily consumption, will soon add another 50-million-gallon reserve reservoir, the need of such a large reservoir being due to the cold weather freezing through a porous volcanic ash 10 to 12 feet deep, stopping the spring flow when a temperature of 20° to 25° below zero is reached. To tide over these extremely cold periods, a large reservoir is needed. The springs are at an elevation of over 10,000 feet, where low temperatures prevail. Reservoirs being such an important and also such an expensive feature of the plant, much time and thought have been given in recent years to the adoption of more modern methods of construction.

The old, slow, tedious, and expensive methods of slip and wheel scrapers and hand shoveling for earth removal have given way to steam shovels, excavating machines, tractors, etc., also there have been changes in mixing, handling, and pouring of concrete regardless of weather conditions. With the advent of modern methods, the saving in time is a big item. One 10-million-gallon reservoir was constructed in 96 days, the concrete walls and bottom being poured in one continuous pouring with three 8-hour shifts. The roof slab, 318 feet in diameter and 9 inches thick, was poured in 60 hours. With modern methods of construction, concrete covered reservoirs are displacing the open reservoirs with their algae and filth-accumulating features. It has not been unusual to fish drowned cats, dogs, cows, and even babies out of uncovered reservoirs.

In the construction of many of the earlier reservoirs, too little attention was paid to making them water-tight, but now, by double floors, waterproofed concrete and various kinds of waterproofing membranes, these reservoirs are made absolutely water-tight. By modern methods of construction, it is not uncommon now to have swimming pools of a million gallons or more capacity built on upper floors of fifteen- or twenty-story buildings.

The value of a good-sized reservoir supply can hardly be measured in dollars and cents, for in many instances they have saved more than their entire cost by:

1. Supplying the entire city when a break occurs in the main feeder of a gravity supply or pumping plant.

2. Supplying a portion of the water at peak hours of consumption, thus avoiding the necessity of larger pumps and pipe lines.

3. Enabling pumping equipment to operate at uniform load, thereby securing higher efficiency in operation.

4. Avoiding drawing too heavily on wells, ruining their yield, through pulling sand against well strainers.

5. Permitting the smaller plants to shut down at night and the larger plants to have time for pump repairs.

6. Enabling the electrically operated plants to fill reservoirs at off peak loads at lower rates.

7. Securing lower insurance rates for cities.

8. Frequently giving fire protection when a breakdown in mains or equipment occurs.

9. Often preventing an entire water famine for long periods of repair in floods or other disasters.

10. Giving to the superintendent and community a feeling of greater security and peace of mind in knowing their lives and property are well protected.

Have You an Adequate Reserve?

The general term "reservoir" refers to the storage of a reserve supply. A reserve supply of water is essential, whether the water comes from wells, springs, rivers, impounding lakes, or any other source. It is the safety-valve of the entire water system. A prudent business man will safeguard his family by insurance or safe investments. A far-seeing water-works official will likewise protect the community by adequate storage reservoirs. It is an insurance policy that protects lives and property. Its size or capacity is often inadequate, for in providing water improvements, if funds are short, the common practice is to cut down the size of the reservoir. Many small plants are operating with scarcely any reserve supply, but why should a water-works official shoulder the risk and responsibility of trying to "get by" and flirt with danger?

ACKNOWLEDGMENT.—From a paper read before the Southwest Water Works Association, at Topeka, Kans.

Genesis of Police and Fire Protection in Philadelphia

From the Autobiography of Benjamin Franklin

I BEGAN now (1737) to turn my thoughts to public affairs, beginning, however, with small matters. The city watch was one of the first things that I conceived to want regulation. It was managed by the constables of the respective wards in turn; the constable summoned a number of housekeepers to attend him for the night. Those who chose never to attend paid him six shillings a year to be excused, which was supposed to go to hiring substitutes, but was in reality much more than was necessary for that purpose, and made the constableship a place of profit; and the constable, for a little drink, often got such ragamuffins about him as a watch that respectable housekeepers did not choose to mix with. Walking the rounds, too, was often neglected, and most of the nights spent in tippling. I thereupon wrote a paper, to be read in the Junto, representing these irregularities, but insisting more particularly on the inequality of the six shilling tax of the constable, respecting the circumstances of those who paid it; since a poor widow housekeeper, all whose property to be guarded by the watch did not perhaps exceed the value of fifty pounds, paid as much as the wealthiest merchant, who had thousands of pounds' worth of goods in his stores.

On the whole, I proposed, as a more effectual watch, the hiring of proper men to serve constantly in the business, and as a more equitable way of supporting the charge, the levying a tax that should be proportioned to the property. This idea being approved by the Junto was communicated to the other clubs, but as originating in each of them; and though the plan was not immediately carried into execution, yet by preparing the minds of people for the change it paved the way for the law obtained a few years after, when the members of our club were grown into more influence.

About this time I wrote a paper (first to be read in the Junto, but it was afterward published) on the different accidents and carelessnesses by which houses were set on fire, with cautions against them and means proposed of avoiding them. This was spoken of as a useful piece, and gave rise to a project, which soon followed it, of forming a company for the more ready extinguishing of fires and mutual assistance in removing and securing of goods when in danger. Associates in this scheme were presently found amounting to thirty. Our articles of agreement obliged every member to keep always in good order and fit for use a certain number of leathern buckets, with strong bags and baskets (for packing and transporting of goods), which were to be brought to every fire, and we agreed, about once a month, to spend a social evening together, in discoursing and communicating such ideas as occurred to us upon the subject of fires as might be useful in our conduct on such occasions.

The utility of this institution soon appeared, and many more desiring to be admitted than we thought convenient for one company they were advised to form another, which was accordingly done, and thus went on one new company after another till they became so numerous as to include most of the inhabitants who were men of property, and now at the time of my writing this, though upward of fifty years since its establishment, that which I first formed, called the Union Fire Company, still subsists, though the first members are all deceased but one, who is older by a year than I am. The fines that have been paid by members for absence at the monthly meetings have been applied to the purchase of fire-engines, ladders, fire-hooks, and other useful implements for each company; so that I question whether there is a city in the world better provided with the means of putting a stop to beginning conflagrations, and, in fact, since these institutions the city has never lost by fire more than one or two houses at a time, and the flames have often been extinguished before the house in which they began has been half consumed.

A Skating-Rink Made and Maintained by Spraying

DURING the last two winter seasons, the Park Board of Yankton, S. Dak., has been so sucessful in maintaining an outdoor skating-rink, that some details of the methods employed in that city will no doubt be of value to readers of THE AMERICAN CITY who may be interested in projects of that kind.

In the vicinity of Yankton, where a layer of gravel lies immediately under the loam in the lowlying ground, it is impossible to form an ice rink by the usual process of flooding. The water takes the frost out of the ground, and before a layer of ice can form, the water is entirely absorbed. The following procedure has been found most satisfactory in overcoming this difficulty. A piece of ground having a slight grade, say 6 inches to a block, is selected. This is then sprayed constantly, using a 1½-inch hose with a spray nozzle, until several inches of ice is formed. The hose is moved constantly while in use; for if it is allowed to remain in one spot for too long a time, the water becomes warm and the ice already formed is melted. If a thaw occurs during the day, the surface water runs off the rink, because of the slight grade of the land, and within an hour or two after the temperature again drops to the freezing point, the rink is once more ready for use.

When the surface becomes coated with flaked ice, a 36-inch galvanized scraper, operated by man power, is used. If the rink is large, the flaked ice can be gathered into windrows and removed with the scraper. A large wooden scraper is first used to remove the loose snow, and that is followed by a small scraper in order to completely clear the surface.

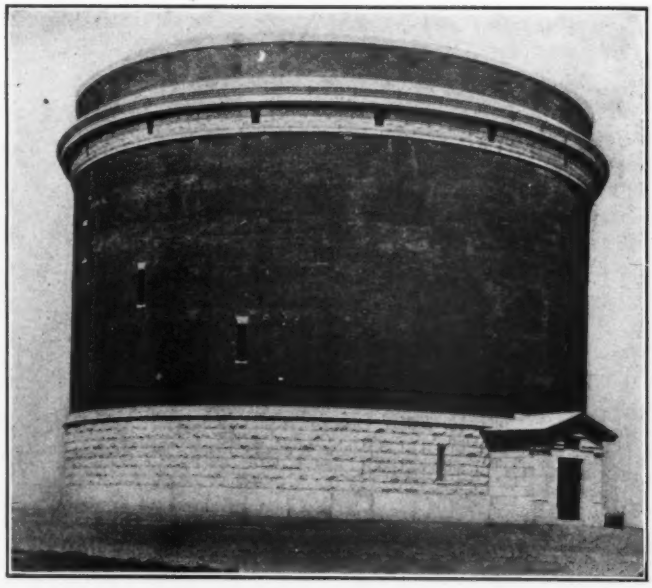
The Yankton rink is maintained by the Park Board at an expense of only $300 per season, and it is open to the public without charge.

—GEORGE W. GURNEY, Superintendent of Parks.

The Water-Supply of Syracuse, N. Y.

By Marshall B. Palmer
Engineer, Bureau of Water, Syracuse

PRIOR to 1888, the city of Syracuse, N. Y., had been supplied for about 60 years by a private water company. The water furnished by this company, it is reported, was not palatable or wholesome, and the works were insufficient and in rather poor condition. A small portion of the city was supplied from Onondaga Creek, other portions from springs and brooks on adjoining hills. Spring water was sold by the gallon and delivered in bottles and tanks. Rain-water was collected on roofs and stored in cisterns for laundry and other purposes. The plant owned by the water company consisted of a pumping-station, three reservoirs, and about 40 miles of street mains, two-thirds of which were of only 4- and 6-inch pipes. The main supply was pumped from Onondaga Creek into Wilkinson Reservoir, this supply being slightly augmented by water from various springs above Elmwood. The old Wilkinson Reservoir was only 108 feet above the Erie Canal, so that where the city now has a pressure of about 95 pounds in the business section, the static pressure was formerly only about 40 pounds, and in case of fires the mains were so small that the pressure dwindled very seriously.



A 66 x 51-FOOT STEEL STAND-PIPE ENCASED IN A STONE AND BRICK TOWER, IN SYRACUSE, N. Y.

The agitation for other supply had been in progress for some 20 years, and as early as 1871 J. J. R. Croes had investigated and reported on a supply from Tully Lakes. Between then and 1888, various projects were broached and companies formed for the purpose of introducing a new supply from a variety of sources.

Municipally Owned Supply Recommended

In 1888, a Board of Special Commissioners was appointed by the Mayor to make a thorough investigation of all available sources of water-supply for the city, with Mr. Croes to take charge of the investigation. A complete investigation, topographical, chemical, and biological, was made of the following eleven sources of supply: Lakes Ontario, Oneida, Otisco, Cazenovia, Tully and Skaneateles, the Salmon River, Seneca River, Onondaga Creek at Cardiff, ground water in the creek valley from driven wells, and the old water company's works. Mr. Croes strongly recommended the water of Skaneateles Lake. This lake is 300 feet deep in places, has an area of 12¾ miles surrounded by a steep, bold watershed of 60¼ square miles, free from swamps and vegetable growth. The water is remarkable for its clearness and its purity. It is situated at an elevation of 460 feet above the business part of the city and 19¼ miles from the city distributing reservoir. The rainfall at Skaneateles ranges from 32 to 48 inches per annum, and the run-off of the lake from 55 to 70 million gallons per day.

Acting on Mr. Croes' advice, the city voted in favor of a municipal water-supply to be taken from Skaneateles Lake, and a Board of Water Commissioners was appointed to take charge of the work. They engaged the late William R. Hill as chief engineer, and Howard Soule as consulting engineer, to design and construct the necessary works. Much opposition was met from the people of Skaneateles,

the mill owners along Skaneateles outlet, and the shippers on the Erie Canal. All of these obstacles were overcome and the works completed so that water was turned into conduit in June, 1894, and Woodland Reservoir was finished and put in use the following year.

The Present Plant

To meet the requirements in the law authorizing the city to take water from Skaneateles Lake, it was necessary to increase the storage capacity of the lake sufficiently to store therein the ordinary annual flow of its watershed. The storage capacity of the lake was increased by removing the old dam, which was 9 feet high, and rebuilding another 17 feet high with a spillway 2 feet higher and a foundation 6 feet lower than the old structure. The bed of the outlet was lowered to conform to the new grade made necessary by the lowering of the gates of the dam. There are six rectangular cast iron sluices, each 3 by 3 feet 9 inches, in the new dam. These gates control the flow of water down the outlet to supply the canal, and through them it is possible to draw the lake down 17 feet below its new high-water mark.

Intake from Lake.—The intake pipe which conducts the water from the lake into the Skaneateles gate-house, as well as the gate-house, was originally built large enough to serve two conduits. The intake pipe is of riveted steel plates ⅜-inch thick and 54 inches in diameter, and extends out into the lake about 6,400 feet. The timber crib at the end is 16 feet square and 12 feet high and is located in 40 feet of water. The water enters the top of the crib through a copper wire screen of 1-inch mesh. Flexible joints were used to allow the pipe to conform to the profile of the lake bottom. When only conduit No. 1 is flowing, there is a loss of head of one foot in the intake pipe. With both conduits flowing into Woodland Reservoir, the loss of head is about 3½ feet.

The Skaneateles gate-house is located about 200 feet north of the lake and contains two wells. Two cast iron sluices, each 2½ by 4½ feet, conduct the water from the upper to the lower well, and in the latter it passes through screens of ¼-inch mesh. The outlets from the lower well into the conduits are through special reducers.

Conduits.—The topography between Skaneateles and Syracuse is rolling, with valleys generally extending north and south. The lake outlet runs due north, and the fall for the first 8,000 feet is only 2 feet. The slope of the hydraulic gradient of conduit 1 is .00236, so that in order to keep the conduit below the gradient at time of low water in the lake it had to be laid pretty deep through a very wet quicksand and silt. This work on conduit 1 was so expensive as to break the contractor, and cost the city some $200,000, or $30 per foot extra, to complete. The legislative act permitting the city to take water from Skaneateles Lake restricted the size to 30 inches on the first conduit. This was later changed so that on conduit 2 a 42-inch pipe was laid on a flatter grade through this bad section. After following down the lake outlet for 3 miles, the divides between valleys are low enough so that a generally straight line was followed from there to the city without getting above the hydraulic gradient.

Conduits 1 and 2 are both of 30-inch cast iron pipe except the upper 8,000 feet of No. 2, where the size is 42 inches. Conduit 3 will be of 36-inch pipe. Section 1 of the latter, 31,800 feet long, has recently been laid but is not yet in service. Concrete pipe is being considered for the upper end and for a new intake where the pressure is light.

Conduits 1 and 2 are thick enough to withstand the static head obtained by closing the valves at the lower end. The lightest pipe (Class A) is ⅞-inch thick and withstands a head of 130 feet. Each succeeding class is 1/16-inch thicker than the preceding and sustains an additional head of 35 feet. Class K pipe is 1½ inches thick and sustains a head of 480 feet. Most of the breaks that have occurred were in the lighter weights of pipe but probably the result of small cracks caused by handling and were overlooked in laying and testing. Gate-valves in brick houses are located about two miles apart and usually on summits. Four-inch special hand-operated air valves are located on all summits on conduits 1 and 2. On these lines considerable pains were taken to obtain a continuously ascending or descending grade between blow-offs and air valves, but on conduit 3 considerable cut and fill was saved by following the surface of the ground closer and installing automatic air valves at each summit. Blow-offs are provided at each depression. The blow-off valves, which range from 6 to 12 inches, are located in brick or concrete manholes.

The conduits cross two ravines, each 100 feet deep, and a third one about 50 feet deep. Special curved pipe embedded in concrete were used at the top and bottom of the slopes to form the vertical curves. Manholes are provided about a mile apart.

Three cross-overs connecting conduits 1 and 2 were installed, and two more are being

placed. In the event of a break in the line, valves can be closed, shutting off the damaged section, and the cross-overs above and below that section opened, and thus only a portion of one conduit is out of commission while repairs are being made. These cross-overs have been found a great help in keeping the reservoir full when repairs are made along the line. The conduits are laid along a leased right of way 60 feet wide, No. 1 in the center and the other two 15 feet on either side.

Thus far Syracuse has used only cast iron for water-mains and it has been very satisfactory. The writer recently traversed 10,000 feet of conduit 2 and found the inside coating to be in fine condition. The pipe numbers and weights painted on the inside with white paint were very legible, and only two small pea-size tubercles were found.

Reservoir.—The only distributing reservoir in the city is Woodland Reservoir, which has a capacity of 121,000,0000 gallons. It is kidney-shaped, has 14 acres of water surface, is 35 feet deep and 220 feet above the business district, is surrounded by spacious grounds attractively landscaped, and is equipped with a very complete system of piping and valves for diverting the flow of the conduits either into the reservoir or the stand-pipe or to the high- or low-service systems.

It is located in a shallow depression at the foot of a hill in a material reported as stiff clay and hard-pan. The embankments at either end were formed from excavated material, and the cut-off walls of clay puddle. The bottom and sides up to the berm, 15 feet above the bottom, are lined with concrete 9 inches thick. Above the berm the sides are lined with a 6-inch layer of concrete, over which is a 12-inch rubble-stone slope wall laid in cement. After 30 years' service these walls are in splendid condition and no leaks have ever been detected.

As this reservoir holds but four to five days' supply, it is felt advisable to provide more storage at or near the city, and with this in view surveys have been partially made at several possible sites.

Distributing System.—In 1890 the city had a population of about 89,000, with 172 miles of streets and only 40 miles of distributing mains, and those small and poor. Under the direction of Mr. Hill, a new system was laid out and constructed, which has been extended from year to year to keep pace with the growth of the city, so that Syracuse now has a splendid distributing system. The mains are so large and the cross-connections so numerous that the pressure remains constant even during the largest fires. The valves or stop-gates are of full size and so located as to allow of closing off only small sections for making connections or repairs. The pressure in the business section is about 95 pounds. There are now 251 miles of mains, 3,600 hydrants, 3,560 gate-valves, 30,900 metered service taps, and 310 unmetered fire services in use. The main arteries of feed from the reservoir are two 36-inch and one 30-inch main.

High-Service System.—Syracuse, while quite level in the business section, is partially surrounded by hills. The highlands lie on the northeast, southeast and southwest quarters. The business section is about 404 feet above sea-level, and Syracuse University is located in the southeastern section and is surrounded by a large residence section, a large portion of which is too high to be served by the reservoir.

In 1909, when the second conduit was laid, it was first planned to build a high-service reservoir on Onondaga Hill, 125 feet above Woodland Reservoir. The excavation would be largely in rock, and the cost of the reservoir, the two miles of mains thereto, the land, upkeep, and watchmen, evaporation, etc., would be so much more than for a stand-pipe close to the reservoir that the latter was chosen and built at a cost of $42,000. It is of steel encased in a rock-faced vitrified brick tower trimmed with massive precast stone locally known as litholite, and surmounted with a steel and concrete dome. The tank is 66 feet in diameter and 51 feet high, and the top is 108 feet above the reservoir and holds 1¼ million gallons. Under normal conditions conduit No. 2 flows into the high-service system, and such part as is not used overflows from the stand-pipe into the reservoir. At times of shortage of water both conduits are turned into the reservoir, and an 8-inch Goulds centrifugal pump is used to pump from low to high service.

In General

In determining the size of the third conduit, it was decided that 50 to 52 m. g. d. would be all the city would be allowed to draw from the lake. While the city has acquired all power rights along Skaneateles outlet, at a very high cost, it is doubtful whether the State Board of Health will allow the city to take any more of the run-off, the total, as above stated, being from 55 to 70 m. g. d.

There are many cottages on the lake. The shores are patrolled by sanitary inspectors, and a boat crew visit all cottages weekly in summer and collect the refuse from the toilets in pails and carry it to a safe distance from the lake and bury it. Samples of water are collected along the shore at the mouths of streams

and tested for infection.

An up-to-date chlorinating machine is operated continuously at the Skaneateles gatehouse, using 42 pounds of chlorine daily at present. Self-registering pitometers are used to measure the flow at each end of conduits 1 and 2, and also the city consumption in both high- and low-service systems. The city now has a population of about 185,000, and adjoining suburbs of 20,000, and an area of 19 square miles. Thomas H. Mather is City Engineer, P. Frank Durkin, Superintendent, and the writer, Engineer, Bureau of Water.

ACKNOWLEDGMENT.—A paper read before the New England Water Works Association, at Rochester, N. Y.

The History of Rubber Roads

By Edgar S. Dorr
Planning Engineer, Boston, Mass.

WITHIN the last two years a lively interest has developed in the subject of rubber pavement. The basis for this interest is an economic one, and is to be found in the enormous accumulation of junk rubber in the form of worn automobile shoes. This junk is practically worthless at the present time; if new and extensive use for it could be found, it would of course be a good business proposition. At first sight the proposition to pave streets with rubber appears absurd and lends itself to the art of the caricaturist.

However, when we learn that a rubber pavement has been in use in London since 1870, without any renewals until about a year ago, a period of 53 years, and that a rubber pavement was laid down 13 years ago for experiment under extremely heavy traffic on Front Street, Cuyahoga Falls, Ohio, was taken up after 11 years, returned to the factory for further heavy duty, and found to have worn down only ⅛ of an inch, the subject assumes a different aspect. Moreover, the continued and increasing activity in laying these pavements in London indicates a measure of satisfaction and shows that the subject is worthy of serious consideration.

Two concerns in Boston have developed very creditable blocks, but have not yet had a chance to submit them to practical test. Other firms in various parts of the country are actively experimenting, but the writer has not enough detailed information for descriptions of all of them at the date of writing.

Economics of Rubber Paving

The governing factors in the problem are first cost and endurance, that is, length of life of the pavement. The real cost of any pavement is the yearly cost, or, to be more explicit, it is the first cost plus maintenance, divided by the number of years that it lasts. The first cost of rubber pavement will be comparatively high, but if its life is correspondingly long, the cost per year will not be higher than that of other pavements with which it is properly comparable. The two kinds of pavement with which rubber is comparable are wood block and asphalt; all smooth pavements show similar characteristics, but rubber possesses them in a superlative degree. It will probably cost, as nearly as can be estimated now, approximately three times as much; if it lasts three times as long, it will be no more expensive. Meanwhile, the public will have enjoyed certain advantages which the rubber pavement offers in comparison to the others, namely:

While all these are smooth pavements, wood and asphalt are slippery under conditions of moisture and frost, and rubber is not; horses obtain a good foothold on rubber, and rubber tires neither skid nor side-slip.

Wood and asphalt are less noisy than granite or concrete; rubber is entirely noiseless.

Wood and asphalt transmit vibrations to the concrete base and to adjacent buildings; rubber suppresses vibration.

Whether the rubber pavement costs as much or more than the other smooth pavements, it is worth more.

On the question of endurance, we have the Cuyahoga experiment in Ohio and the St. Pancras Hotel pavement of 1870, in London, to judge by. At Cuyahoga the rubber pavement showed ⅛-inch wear in 11 years; assuming ½-inch wear to be the limit, it would last 44 years. The St. Pancras pavement showed 3/16-inch surface wear on the average in 53 years. These are surely examples of long life in pavements, and indicate clearly that the life of rubber pavements may be expected to more than offset the higher first cost, and also that the interruption of traffic for renewal would be reduced to the minimum.

Manufacture of Rubber Paving Blocks

In the manufacture of rubber pavement both old stock and new rubber are used, and economy calls for as large a proportion of the old and as little of the new to be used in the combination as is practical in making a resilient, tough and enduring block. The old stock is ground, or, preferably, macerated in such a way as to preserve some length in the threads of cotton fiber which were originally fabricated into the tire. It is then mixed with new rubber, molded into the form of block or slab preferred, and vulcanized under a pressure of 2,500 pounds per square inch and a temperature of 300 to 400 degrees Fahrenheit. In one of the two kinds of blocks developed in Boston, the new stock in the block is as low as 15 to 20 per cent and the block is apparently sound and resilient enough for the service it is required to render. This is probably the low limit; the Racine block has 38 per cent of new rubber.

Blocks Replace Slab Paving

Rubber pavement has been made in two styles—slabs and blocks. The early rubber pavements were in the form of slabs, long enough to reach from curb to curb, laid on a concrete base, and either attached to the base by iron bands at the curb, or fitted in tightly without mechanical attachment to the base. When some of these were taken up recently for renewal, a curious phenomenon was revealed. They had worn more on the under surface than on the upper. The theory which fits the observed fact is that the rubber flows or stretches under the point of most intense pressure of the loaded wheel and then resumes its form as the point of pressure moves on, causing a slight rubbing between the slab and the base, and the concrete abrades the under surface of the slab faster than the traffic wears down the upper surface.

Probably for this reason the slab form seems to have been abandoned, and all the later English forms are blocks. The idea has been to attach a rubber cap, about ½-inch thick, to a wooden or concrete block, so that the block could be laid like any other block pavement. These attempts have not been eminently successful. Many devices have been tried to attach the cap to the block; even steel plates with the rubber vulcanized on, and attached to the block by ears or flaps, have been used, but the plates cupped under the pounding of the traffic and became detached from the blocks. The most successful block of this kind consists of a ½-inch rubber top vulcanized onto a block made of a low-grade rubber compound with just enough rubber in it to admit of vulcanizing. This was the kind of block laid around the Cenotaph, in London; the block remained intact, but the job is a partial failure, having crept badly. The explanation given is that these blocks were laid upon a one-inch bed of wet or moist mortar on a concrete base, and the traffic was admitted too soon, the mortar having taken an unusually long time to set. This is probably the correct explanation; mortar enclosed between a concrete base and an impervious rubber pavement would require an indefinite but long time to set, much longer than under ordinary conditions, because there would be no way for the excess water to escape except through the concrete base; it would be difficult to tell when it had set hard enough to resist the disturbing influence of the traffic. It would be particularly vexatious in the case of patches where openings have had to be made. Under ordinary conditions in a crowded street, it is very hard to keep traffic off long enough for cement to set.

Rubber Paving To-day

The present status of the rubber pavement proposition is that it is practical for plank-surfaced bridges and peculiarly desirable for draw-spans, both for economy and supression of vibration. When a practical method of attaching thin and therefore economical rubber paving to a concrete base shall have been devised, we shall see rubber pavement upon city streets, first in those locations where noise and vibration of buildings is very objectionable, as in the vicinity of hospitals, churches, and office buildings, and later wherever a particularly high-grade pavement is desired.

While it is not obvious why a wet mortar bed was required for a block of this depth, 3 inches, with corrugated interlocking sides, the subject is worth discussion, because it seems to be a favorite notion of American inventors in this field to devise a comparatively thin block with protuberances of some kind on the underside to be forced into plastic mortar in order to secure a bond with the base. They are economically right in designing a thin block, because there is no need of a thick block of such slow-wearing material, and because, although it may be possible to prove that an expensive pavement is economical in the long rnu, it will take a long while to demonstrate it to the American public, and meanwhile high first cost will be a bar to the introduction of rubber pavement. But a thin block requires attachment to the base, and the writer cannot

see the practicability of the plastic mortar bed. It would have to be plastic enough to admit the bonding attachment to be forced into it and at the same time stiff enough not to be thrown into waves under rolling or ramming.

It seems to the writer that a positive mechanical bond remains to be devised to attach the economical thin block to the concrete base.

It may be suggested that the English rubber composition block of the Cenotaph type could be laid on a dry cement and sand cushion, as wood blocks are laid, and apparently it could, although it was not so done.

That may be the solution for city streets. But it is 3 inches thick instead of the 1 inch or 1½ inches of the American blocks, and rubber, the expensive ingredient, has to be used throughout its whole volume. It is said to cost over £3 (about $16) per square yard. Even if made here, duty-paid, its cost would probably prevent its use.

Rubber Blocks for Bridge Paving

In the case of bridge paving, the conditions are different. The blocks can be spiked to a wooden deck. One of the two types heretofore mentioned as being developed here is molded with conical holes to admit of spikes; the holes are to be closed with conical rubber plugs to be cemented in. It has not yet been tried out. The Racine block has been tried; two short patches were laid last May on the draw of the Northern Avenue bridge to South Boston. Although the time is short, the test so far has shown it to be absolutely satisfactory. The fine graining on the surface, the imprint of the mold, has not yet worn off under very heavy traffic of all kinds, horse-drawn, steel tires and rubber tires. It sustained a severe and unplanned test recently. This bridge carries a track of the Union Freight Railway. A freight car jumped the track and went across the pavement. The flange of the wheel cut grooves in the wooden planking of the bridge at both ends of the rubber section, but the rubber paving was absolutely uninjured, not even a perceptible groove being left in it.

This block is 12 x 6 x 1 inch thick, with spiking flaps about ¼-inch thick, with or without additional cotton fabric, projecting at the bottom of the block, two from one side and one from one end. These flaps are received into and covered by recesses in adjoining blocks, so that the blocks break joint and abut closely. In addition to the spiking they are cemented to the wooden deck and to each other with a rubber and asphalt cement. At the present writing the surface is entirely unmarred by horseshoe calks or anything else.

Although these sections are too short, being only about 14 feet long, to afford as satisfying a demonstration as they would if they were longer, they do show enough to substantiate the claims of the advocates of rubber paving, that it is noiseless, not slippery in wet weather, and suppresses vibrations. The latter property is a valuable one for iron bridges.

Rubber pavement is peculiarly well adapted for draw-spans because it is the only pavement known which possesses elasticity to accommodate the unavoidable bending of a draw-span surface when the draw is opened or closed.

Enough has been learned from the sections on the Northern Avenue bridge to lead the writer to assert without qualification that rubber pavement is the best ever invented for draw-spans and is more economical than a plank surface for bridges upon which the traffic is so heavy as to require, as at Northern Avenue, renewal two or three times a year.

This particular paving on the Northern Avenue bridge was presented to the city by the manufacturer for experiment; his statement as to cost was that, when produced in quantity, it would be furnished for $12 to $13 per square yard.

ACKNOWLEDGMENT.—From a paper read before the American Society for Municipal Improvements, at Boston, Mass.

The Heart in Hartford

IT is there, officially, as evidenced by the warm and friendly greeting that is sent out from the City Hall, by the Juvenile Commission of Hartford, Conn., to the parents of each newborn citizen. The first page of the little four-page folder bears the seals of the state and the city, the name of the baby, the date of its birth, and the names of the parents; also these lines:

"So wee a gift, yet wealth of many lands
Could never buy it in the richest marts;
So frail a gift, and yet those baby hands
Take mighty hold upon all human hearts."

The inside pages contain a message of kindliness, congratulation and respect from the Commission, calling attention to the importance of early influence upon the life of the child, and to the value of his citizenship as well as to its responsibilities.

"He [or she] is one of a million citizens of the state, among one hundred thousand residents of our city, and should grow up to make himself felt among the people. In twenty-one years he will become a part of the making of laws and of their execution."

If It Were Not for Snow Removal, Fire Equipment Could Not Be Effective

A BARBER-GREENE SNOW LOADER WITH END DISCHARGE, LOADING BOB-SLEIGHS DRAWN BY HORSES

The machine illustrated is owned by the Ottawa Electric Railway, Ottawa, Ontario, and according to J. M. Ahearn, Assistant Manager and Purchasing Agent, has replaced between 60 and 70 men. The 5-yard motor trucks are filled to a peak load in from 20 to 45 seconds

MOTOR FIRE APPARATUS OF THE TOWN OF PITTSFIELD, MAINE

The two pieces of apparatus shown above—a Foamite-Childs triple combination at the left and a Packard twin-six at the right—are doing effective service in the Pittsfield Fire Department, which consists of 23 call men and two chiefs, according to Ray H. Badger, Fire Chief, to whom we are indebted for the photograph and this information. The new Foamite-Childs triple combination replaces the old-fashioned hose reels.. Its equipment consists of a 1000-foot hose body, mounted on a Dodge-Graham chassis, two 35-gallon chemical tanks, a 350-gallon capacity Northern rotary pump, a 20-foot extension roof ladder, a 34-foot extension ladder, a plaster hook, an ax, extra charges for chemical tanks, one Foamite emergency extinguisher for gas fires and one acid extinguisher, also two LaFrance gas masks. The Packard twin-six was bought and fitted up by the Fire Department as a hook and ladder truck, carrying twelve ladders, two hooks, two axes, as well as coats, hats and boots for the firemen. On Saturday, September 20, the triple combination was called to a fire which was put out with one chemical tank, in spite of the fact that there promised to be a serious conflagration

Garbage and Trash Collection and Disposal

By C. H. R. Fuller, B. A. Sc.
City Manager, Chatham, Ont.

THERE is no branch of municipal administration that has caused more trouble for city officials in finding a proper solution of the problems it entails than the collection and disposal of city wastes. Methods of collection are changing rapidly; some cities are in the process of adopting the truck-tractor and trailer system, while others prefer to adhere to the horse-drawn vehicle. Methods of disposal vary in many cities. Some cities are successfully disposing of garbage and refuse by what is known as the sanitary fill method. Others feed to hogs, others have reduction plants, others incinerators. One city may be successfully using a particular method, while the same method may have been a failure in another city.

The garbage and refuse problem of any town or city must be carefully studied. All facts and figures at hand, the amount of funds available, general local conditions, etc., must be taken into account, and one or possibly two methods of disposal may then be decided upon. The problem seems to be so different in each community that there is no set of rules or stated practice which may be followed.

Let Sanity Solve the Problem

The method of disposing of garbage and rubbish has always been a problem in a great many cities. Considerable sums of public money have been expended in plants of various types which have been closed down even before being placed in operation, or operation stopped after a few years. The garbage question always makes a fine political football, and apparently in many cases the hands of our city engineering departments have been tied. The effective solution of various garbage disposal problems requires close study by engineers trained in this subject and the solid backing of the elected representatives of the people in charge of carrying out the solution decided upon. If this is not the case, nine times out of ten the solution will not work properly. Continuity of civic administration will do much to prevent the scrapping of plant or method for purely political reasons, and the various managerial administrations and improved city governments have a special opportunity of demonstrating what may be done.

The Position of the Householder

The first step in taking care of the city's waste products is the formulating of proper city ordinances or by-laws requiring the householder to place the household wastes, such as garbage, tin cans, ashes, rubbish, etc., in proper form for collection. The method the householder is required to follow of course depends largely on the final method of disposal. He is required, however, to have properly covered garbage receptacles which may be easily handled by the collector. He must have separate containers for the ashes, since these are usually collected separately according to the American practice of disposal.

If the citizens of any municipality can be made to realize the importance of observing the civic ordinance in this connection and the value of preventing the fly nuisance by such methods, the first step in getting rid of the garbarge and trash has been made. The writer knows of one particular case where inspectors were placed on the collection routes with instructions to advise the householders regarding the method of placing out the household wastes. Kitchen cards were also distributed. The results noticed in an immediate improved collection were well worth the expense.

Collection and Haul

The collection of garbage and trash may be made by the city with its own organization or by letting this work by contract. Local conditions usually determine which system is the best for the particular city or municipality, although the majority seem to be more favorably inclined to collection by the city.

Actual methods of collection in use at the present time are: (1) by horse-drawn vehicles; (2) by tractor and trailer; (3) by motor trucks.

The method of collection is decided upon

mainly by the amount of garbage and refuse, the length of haul, methods of final disposal, and the costs of each method under local conditions.

In a recent survey made by the City Managers' Association of 100 city manager cities, 52 places reported using motor trucks—presumedly this also includes trailers—and 43 reported using horse-drawn vehicles. The haul averaged about 3 miles. In this survey the costs of collection varied from 35 cents to $5.80 per ton, but whether these figures were applied to truck collection or horse-drawn collection was not stated. The populations of the various cities reporting were not given. The frequency of collection appeared to be in most cases twice weekly.

The cost of collection in Chatham, Ontario, which has a population of about 14,500 and collects all wastes from householders once a week and from business places twice and sometimes three times weekly by means of horse-drawn vehicles under contract, is about $1.50 per ton for collection and a 1½-mile haul to an incinerator. This service also includes disposing of clinker and ashes on a dump provided by the city.

The collection method using tractor and trailer for larger cities where the haul is long is a neat system and is a saving over the cost of the horse-drawn wagon where it is being used. The trailer is so constructed that it may be hauled by teams during the actual house collection, similarly to a wagon. When loaded, the trailers are taken to a central yard, where an empty trailer is immediately connected and the loaded trailer is made up into a train of vehicles and hauled by truck or tractor to the point of disposal. From cost figures given in THE AMERICAN CITY, Milwaukee saved over $200,000 in one year over the old system. Winnipeg reduced its cost from $4.03 per ton to $1.70 per ton.

In comparing cost data it should be remembered that some cities make a charge for collection. With the majority, however, the cost is included in the general tax rate. Also in many places not all the house garbage and refuse is collected by the city.

Disposal

The final disposal of garbage and rubbish and other city wastes in a satisfactory manner, that is, economically and without nuisance, is largely a local problem. Street refuse and ashes are usually taken to dumping grounds, while garbage and rubbish may be disposed of by dumping, hog feeding, reduction, or incineration. Combinations of methods exist in a great many places.

The method of disposal has always been a problem and still is a problem in a great many cities. Considerable sums of public money have been expended in plants of various types which have been closed down even before being placed in operation, or operation stopped after a few years. The garbage question always makes a fine political football, and apparently in many cases the hands of our cities' engineering departments have been tied. Effective solving of various garbage disposal problems requires close study by engineers trained in this subject and the solid backing of the elected representatives of the people in carrying out the solution decided upon. If this is not the case, nine times out of ten the solution will not work properly. Continuity of civic administration will do much to prevent the scrapping of plants or methods for purely political reasons, and the various managerial administrations and improved city governments have a splendid opportunity of demonstrating what may be done. An abbreviated description of the various methods of disposal in operation in the United States and Canada may be interesting and is outlined here.

Dumping or Sanitary Fill Method

Dumping is used by many cities, but very often is the cause of extended litigation on the ground of nuisance. In some cities where local conditions are more favorable, disposal by dumping is carried on very successfully. Sanitary fill has taken on an aspect of importance lately because of the action of the city of Seattle in discontinuing the use of destructor plants and successfully dumping garbage, ashes, and other refuse on low land without causing any nuisance. The cost of disposal in Seattle exclusive of collection and haul is apparently only 30 cents per ton, or less than one-third the former cost by incineration. Hotel and restaurant garbage is taken by contractors for hog feeding. The garbage and refuse is covered with earth 2 or 3 inches deep and the low-lying ground is built up by successive layers of earth and garbage. This method is being used in England quite successfully, but 9 inches of earth covering is insisted upon, even though there is only about 10 per cent wet garbage in English wastes.

Where dumping grounds are available and very little objection is raised, the sanitary fill method may be carried on successfully and valuable land may sometimes be reclaimed, although the establishment of this system is de-

pendent on purely local conditions.

Hog Feeding

Hog feeding as a method of disposing of garbage is in use in a number of large American cities. The writer has no information regarding any Canadian city using this system. The great difficulty in applying this method is in securing a site. Also, hog feeding takes care of only about 50 per cent of the garbage, and other methods must also be used to dispose of hog manure, the uneaten garbage, and the refuse. Most hog-feeding disposal methods are carried out by contract, the owners of the hog ranches usually paying the municipality a stated price per ton for the fresh garbage delivered at the hog farm.

Thirty-two of a hundred city manager cities reporting in the recent survey stated they were disposing of garbage by hog feeding. The price paid to the city of Buffalo was 50 cents per ton of fresh garbage, and that paid to Los Angeles was 60 cents per ton delivered. The city of Buffalo afterwards took over the hog farm and operated it with the city's organization. Sacramento is a case where hog feeding has replaced incineration, and the result will be watched with interest.

Disposal by Reduction

Disposal of garbage by reduction has always interested civic governments because of the claim that this method has often been a money-maker for the municipality. It can be applied successfully only in larger cities where there will be enough garbage to make the installation of a reduction plant worth while. The method aims at the extraction of grease and tankage, which has a variable market value. The control of odors is difficult, and consequently most reduction plants have been forced to the outside of the city and in a few cases to a considerable distance from the city. Lately, new processes have been quite successful in destroying odors, and some plants are being operated at the present time in built-up city districts.

Difficulty in financing these plants has been the cause of trouble in many cases where the plants have been operated by contractors, and has resulted in some instances in the city's taking over the plant and operating it. The operating cost of such plants varies from $2.30 per ton to $6 per ton, and the income per ton may be anywhere from $3 per ton to $5 per ton, depending on conditions.

Disposal by Incineration

This is the method most commonly used in our Canadian cities, and the majority of plants are apparently being operated economically. The writer has not heard any stories of the high cost of incineration where these plants are being operated in Canada, although some American cities appear to have had difficulty and plants have been closed up and other methods adopted for disposal.

Where disposal by incineration can be successfully operated, it appears to have many advantages, especially to the smaller cities. All garbage and refuse of the city except ashes and non-combustible matter can be put through the incinerator. The refuse not taken care of by the plant can be disposed of by dumping, without causing any nuisance. This simplifies disposal, especially when the plant itself can be operated without creating annoyance to any one.

The first step in economical operation of the plant is the proper arranging of the materials put out for collection. Garbage is sometimes required to be drained and wrapped and placed out in a covered receptacle. Ashes and non-combustible matter, being collected separately, are placed in separate containers. Tin cans may be placed with the wrapped garbage and go through the plant for purposes of sterilization.

The city of Chatham, after due study of local conditions, constructed an incinerator in the fall of 1922, and since being placed in operation the plant and method of disposal appear to have been successful. The plant is small, having a capacity of 20 tons of mixed garbage and refuse in 10 hours. About 3,000 tons of garbage and refuse are destroyed per annum. No capacity for storage is provided, the garbage being discharged from the wagons to the furnaces. For a particularly wet garbage, a fuel-oil plant is kept standing by, although its use is confined to a few weeks during winter weather. The natural fuel collected with the garbage is usually sufficient to consume it without nuisance and turn out a good, clean clinker. Everything goes through the plant except ashes and night soil. The ashes, with the tin cans and clinker from the incinerator, are disposed of on a dump or on low-lying ground. The cost of the plant without site was $30,184. The plant takes care of a population of 14,500, and has the ability to look after an increase for many years.

Incinerator plants are also being successfully operated in the following Canadian cities: Toronto, London, Outremont, Westmount, Sarnia, Stratford, Peterborough, Windsor, and Kitchener. The cost per ton of

operation varies from 30 cents to $1.50, exclusive of carrying-charges, depending on the plant and the amount of garbage and refuse disposed of.

The cost of operation per ton of mixed garbage and refuse is as follows:

Labor	.40 cent
Fuel oil (part time only)	.07 cent
Electric power	.05 cent
Lubrication, maintenance	.01 cent
Supervision, office, etc.	.02 cent
Total operating cost (per ton)	.55 cent
Carrying charges 10-year bond issue (per ton, 1923)	$1.43

English Methods of Disposal

Destruction by Burning.—Probably the most common method of disposal in England is by burning in high-temperature destructors. In most cases all refuse and garbage, including ashes, is put through the plant.

Pulverizing.—This is a newer method, by which the garbage is pulverized and pressed and sold as fertilizer.

Screening and Sorting for Salable Materials.—This method is used in connection with a destructor plant and is lately being put into operation in several large English cities.

The character of English refuse is very different from that collected in cities in Canada and the United States, and this should be taken into account in formulating methods on this continent.

Greater Interchange of Data Will Promote Efficiency

There is a need of some definite system of comparing costs and the details to which these costs apply. At the present time we hear of unit costs being given, but are unable to differentiate clearly between various methods. There seems to be a need for more information, and civic administrators can be greatly benefited by the interchange of data and costs and the publication of the experiences of various cities, especially in Canada and the United States.

ACKNOWLEDGMENT.—From a paper read before the City Managers' Association, at Montreal.

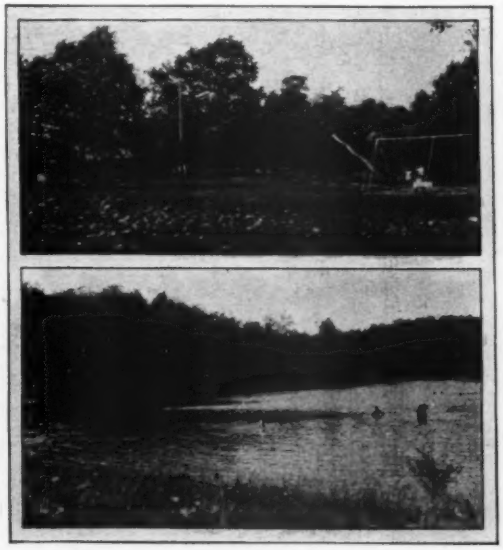
Kiwanis Builds Dam for Park Lake

HUBBARD, OHIO.—When a 37-acre tract of land was donated to this city by one of our public-spirited citizens, Jacob Kalver, the Hubbard Kiwanis Club at once saw the possibilities for developing the land into a much-needed outdoor recreational center for the community. Harding Park, as the site has since been named, is now a beauty-spot that is enjoyed by all the people of the vicinity, and it is looked upon with particular pride by the local Kiwanians, who not only took the leadership in planning the project, but performed a large part of the actual labor involved.

The main item in the undertaking was the construction of the dam necessary to form the lake. The Public Affairs Committee of the Club was asked to outline a program whereby the necessary funds might be raised, and as a result the Club members were organized into teams to make a house-to-house solicitation. The men then formed themselves into labor gangs, and many evenings were devoted to mixing concrete, clearing the lake bottom of vegetation, etc. In this way a considerable saving in labor costs was, of course, realized, and we were able to complete the structure with an expenditure of only about $4,600. On several occasions when difficulties arose and delays in the construction work seemed certain, the Chairman of the Public Affairs Committee, William Powell, who himself shared in the actual work, utilized some of the man power and machinery from the Powell Pressed Steel Company, of which he is President.

The large lake with its wooded banks is one of the most attractive features of the park, and it also affords a welcome opportunity for bathing during the summer season. Swings and other pieces of modern playground apparatus have been installed for the benefit of the children, and in some shady spots tables have been provided for the use of picnickers.

G. R. BAILEY,
Secretary, Hubbard Kiwanis Club.



A VIEW IN HARDING PARK, HUBBARD, OHIO, AND THE LAKE WHICH IS ONE OF THE RECREATIONAL FEATURES OF THE PARK

Forward Steps in City and County

Traffic Congestion and Accidents Greatly Reduced

BIRMINGHAM, ALA.—The system of traffic control now in operation in Birmingham is unique in that it is handled by one man stationed in a tower at a street intersection in the heart of the loop district. The suspension type signaling system shown in the accompanying illustration has been installed, and all units are operated in unison from the central tower. Three lights are used: red, signifying "stop"; amber, "caution, clear intersection"; green, "go." These lights are controlled by an automatic time flasher operating on a schedule of thirty seconds for traffic in either direction, with a five-second interval to allow for the clearing of traffic at the intersections between the changes.

In order that fire department apparatus and ambulances may have a clear right of way through the streets, all stations receiving calls for apparatus are required to notify immediately the officer in the traffic tower, by means of a special wire installed for the purpose. The amber light is then flashed at all units of the traffic signaling system, a bell is rung continuously, and traffic comes to a complete stop until the lights change and the bell ceases.

ONE OF THE SIGNALING UNITS WHICH ARE REDUCING TRAFFIC ACCIDENTS IN BIRMINGHAM, ALABAMA

CENTRAL TOWER OF THE BIRMINGHAM TRAFFIC SIGNALING SYSTEM

Whether or not this system of traffic regulation has proved satisfactory may perhaps best be judged from the fact that previous to the installation of the system, this city had a daily average of from two to six accidents in the loop district. The system was installed in January, 1924, and since that time the city has had only four minor accidents in the loop district. This is a record of which the city is justly proud, especially in view of the fact that the volume of street traffic is steadily increasing. At the present time 68,000 automobiles, in addition to street cars and other vehicular traffic, pass through the loop district, on an average, every day. Not only has congestion of vehicular traffic been almost eliminated, but our force of twenty-six street traffic officers are enabled to regulate pedestrians with much greater ease than formerly.

W. W. BRENT,
Captain of Traffic.

"Stop! Look! Listen!"

SHEBOYGAN, WIS.—While the city of Sheboygan has been fortunate in having but few accidents at the railroad grade crossings within its limits during the past few years, it has made an effort to still further decrease the number of accidents at these points by adopting the Wisconsin state law under which municipalities may require the stopping of all motor-driven vehicles at railroad crossings. Section 1 of the city ordinance, which went into effect in the early part of 1924, reads as follows:

"That the driver of every automobile, motorcycle or other motor-driven vehicle be and is hereby required, when traveling any public road, street or highway within the city of Sheboygan, to come to a full stop before crossing steam railroad tracks at grade at a distance of not less than ten feet nor more than fifty feet from the nearest rail of such railroad track or tracks; provided, however, that this ordinance shall not apply to the automobile or other motor-driven vehicles of the Fire Department of the city of Sheboygan when responding to an alarm of fire, and shall not apply to any automobile or other motor-driven vehicles of the Police Department of the city of Sheboygan when responding to an emergency call, or to motor-driven ambulances responding to an emergency call."

Although it cannot be said at the present time that this ruling is obeyed by all automobile drivers in this city, the number of autoists who recognize the wisdom of obeying the stop signs is steadily increasing. In the writer's opinion, every driver should stop before crossing a railroad track at grade in order to protect his own life and the lives of those with him in the car, regardless of whether or not he is required by law to do so.

HERMAN SCHUELKE,
Mayor.

Beautification of County Highways

TAMPA, FLA.—Hillsborough County, Fla., of which Tampa is the county-seat, is among the first counties in this state to show marked activity in the beautification of its highways. Here the work is making rapid strides under the direction of the Hillsborough County Beautification Commission, an organization which came into being early this year, sponsored by the Tampa League of Women's Clubs and the Tampa Junior Board of Trade.

One of the most effective and inexpensive improvements so far accomplished has been the taking down of the small tin and wooden signs that pepper the fences and trees along the rights of way of the county highways. More than 1,000 of these signs have already been removed, and the rest will soon disappear. It is hoped that Hillsborough County's step in this direction will culminate in a state-wide movement for the elimination of these signs. Already the effect of this action, due to the publicity given it, can be seen in other sections of the state.

Plans are now under way for the beautification of one mile of highway on one of the main arteries leading out of Tampa. This will serve to demonstrate the Commission's conception of the ideal highway, and will at the same time show the public just what kind of results can be accomplished by the Commission's efforts. Five miles of highway in a more remote part of the county have been improved by means of whitewashing the fences and the planting of vines along the way, the property owners having given their assistance in this. On another highway, nearer the city of Tampa, the property owners purchased 500 palm trees, and the Commission met the expense of planting and supervised the work. The President of the Commission has donated $1,000 worth of palm seed to his organization, and several prominent citizens have promised to make other donations of this kind as soon as the need for them arises.

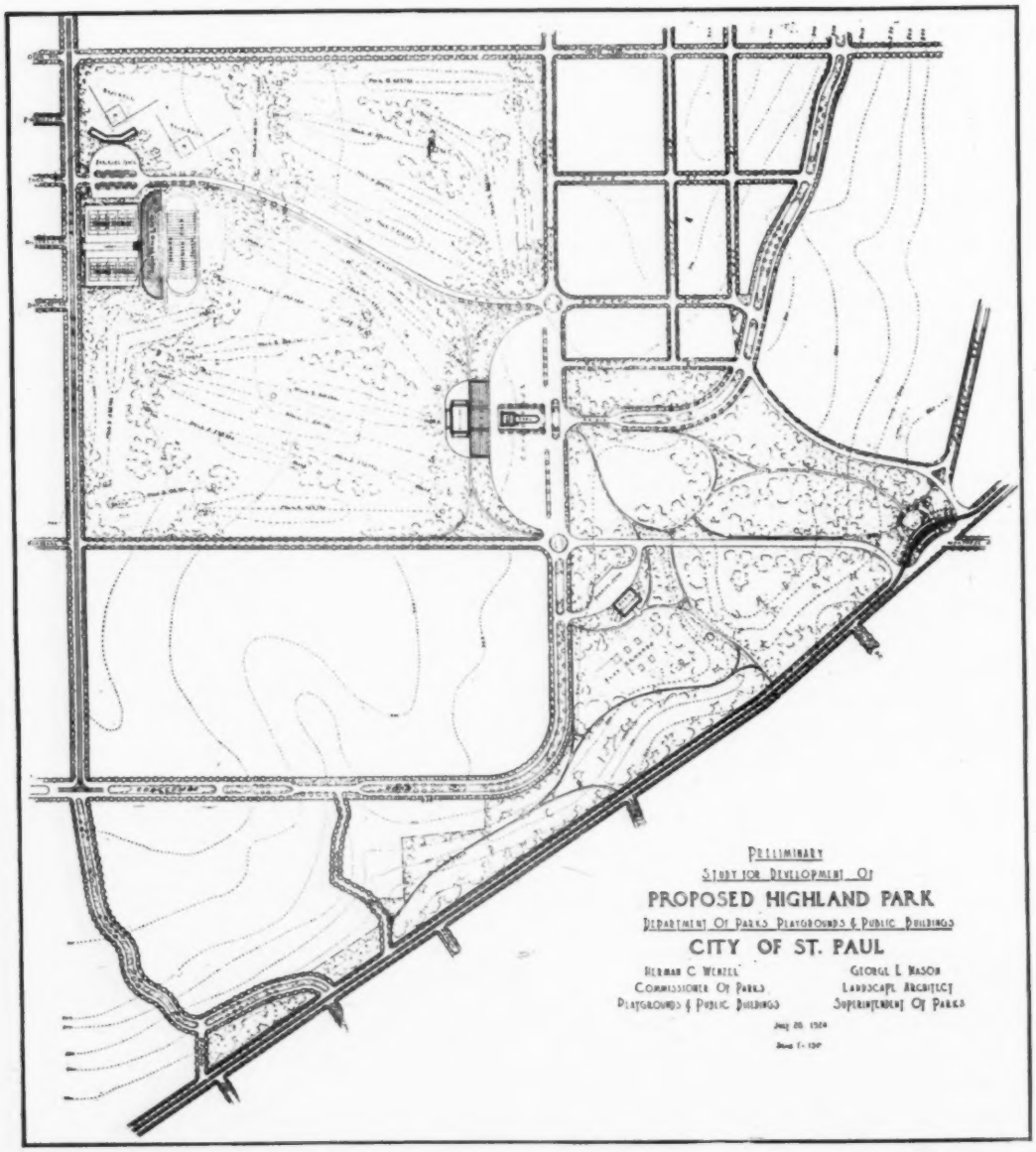
The County Commissioners are in full accord with the program and have assisted to the extent of preparing the shoulders of the highways for the planting of shrubs, and by making allowances for this on new roads under construction. It is also believed probable that the county will make an appropriation in its budget for the coming year to help defray the heavy expenses of the Beautification Commission, which at the present time is dependent for its income on the $1 per year dues of its 600 members.

Thus far the Commission feels that it has fully justified its existence, and with the support of the county as already demonstrated, we feel confident of success in the comprehensive program which has been undertaken.

J. R. COLHOUN,
Secretary, Hillsborough County Beautification Commission.

ABOVE.—THE ROAD IN HILLSBOROUGH COUNTY, FLORIDA, WHICH BECAME THE MEMORIAL HIGHWAY

BELOW.—THE HILLSBOROUGH COUNTY MEMORIAL HIGHWAY, TAMPA, FLA.



Park of 204 Acres to Be Financed by Special Assessments

ST. PAUL, MINN.—The City Council of St. Paul recently voted to increase the recreational facilities of this city by the purchase of 204 acres of land for a city park, at an estimated cost for land and improvements of $479,000. The acquirement of this park area was first proposed and urged by the St. Paul Planning Board, and was actually brought about through the efforts of H. C. Wenzel, Commissioner of Parks, Playgrounds and Public Buildings.

In addition, a 40-acre tract of land owned by the Water Department, lying adjacent to the new park area, has been made available by that department for use in the development of this park. On this property stands a 30-million gallon concrete groined-arch reservoir. The top of this reservoir, which has been sodded over, is the highest point in the city and commands a fine view of the complete horizon around the two cities, St. Paul and Minneapolis. Adequate highway approaches to the park are provided by Edgcumbe Road, a parkway 120 feet in width, which runs through the park, Montreal Avenue, 86 feet in width, and Snelling Avenue, 100 feet in width.

The proposed development of the entire 244 acres of land, comprising 160 acres of rolling land and 84 acres of wooded hillsides, may be seen by the plan reproduced herewith. Since the character of the land lends itself admirably to the construction of golf links, tennis courts, and athletic fields of all kinds, considerable space has been allotted for these purposes. The layout also includes a

swimming pool, a band-stand, children's playgrounds, picnic pavilion, and ample parking space for automobiles, designed by George Lester Nason, landscape architect, and recently appointed Superintendent of Parks.

The city will proceed to purchase this land on an appraisal made by the St. Paul Real Estate Board, acquiring the property by condemnation where it cannot be purchased outright at the appraised value. The cost of the project will be covered by assessments spread over the district to be served by the park—an area of nine square miles. This section has at the present time a population of 43,000, but under the city's zoning ordinance this may be increased to 180,000. The assessments range from $1.45 per front foot for abutting property, down to 24 cents per front foot on that property farthest away from the park.

GEORGE H. HERROLD,
Managing Director, City Planning Board of St. Paul.

Detroit's Three-cornered Mayoralty Election

By William P. Lovett
Secretary, Detroit Citizens' League

JOHN W. SMITH, former State Senator and former Detroit Postmaster, has been sworn in as the first "minority mayor" of Detroit since the modern charter went into effect six years ago. He will serve the unexpired term of Mayor Doremus, who resigned on account of ill health—a period of about one year.

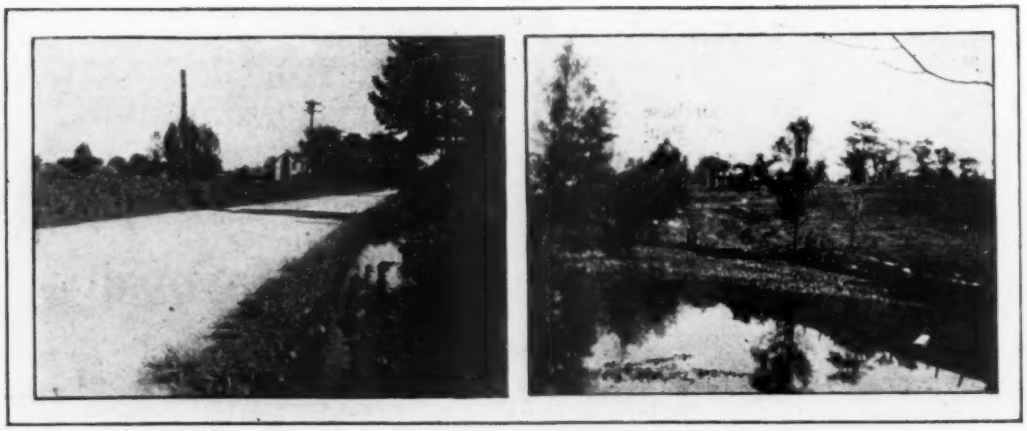
Charles Bowles, the "sticker" candidate for mayor, who had the backing of the Ku Klux Klan and of a small group of fraternal order members, finally gave up the fight. He was defeated in the primary of September 9; but on the ground that he had had no press support, he ran independently for the election against the two nominees of the primary, Smith and Joseph A. Martin. The vote on November 4 placed them in the order—Smith, Bowles, Martin, each getting about 100,000 votes. Bowles got a recount and still was rated second.

He then appealed to the Circuit Court, on the ground that the election commission had refused to admit ballots on which voters had not conformed to state law with regard to proper spelling of the candidate's name, etc. The Bowles people voted in two ways—with stickers, or by writing in the names "Charles Bowles." Several thousand ballots claimed by Bowles showed intent to vote for him, but the spelling or other factors were so uncertain and contrary to state law, that not even the rule of "idem sonans," or similar sound, could be claimed.

Even if the "idem sonans" rule were followed, the election commission found that Bowles would not have beaten Smith. Yet enough questionable ballots were thrown out to prompt the appeal to the courts. The Circuit Court sustained the Detroit election commission. Bowles decided not to carry the case up to the Supreme Court, for two reasons: first, such an appeal might not get to a decision till the Mayor's brief term had nearly or quite expired; and, secondly, it would be contrary to good public policy to becloud all city transactions, in which the de facto mayor was concerned, by pushing the issue as to his right to the office. Thus the accepted ruling, which rejects the "idem sonans" standard, stands. The election commission hoped the test case would be carried up.

Prevailing Detroit opinion favors amendment of state law and of the city charter, eliminating the possibility of any future three-cornered fight, by eliminating the ballot space for an independent or sticker candidate after the two nominees have been chosen, in a non-partisan primary, by the voters. The charter does not contemplate the possibility of a minority mayor. It is held that the additional blank space, provided generally where the party system of elections prevails, has no place in a non-partisan system, because all voters, both in the primary and in the election itself, vote independently and without party restrictions.

Michigan law, sustained by the courts, rejects the "idem sonans" standard, on the ground that a ballot should be rejected if the voter is not sufficiently educated or otherwise intelligent to know how to spell the name of his candidate. Bowles' legal name, "Charles Bowles," was not adhered to arbitrarily, but voters were required to indicate what "Bowles" they wanted to vote for. Ballots were admitted on which the name was written "Charlie" or "Chas.," but not if any middle initial, or merely the first initial, "C.," appeared alone before the surname. A negro, Walter Bowles, claimed 2,473 ballots on which only the name "Bowles" was written.



IMPROPERLY GRADED DITCHES AND UNDRAINED BORROW-PITS ALONG HIGHWAYS HELP TO PRODUCE OUR MOSQUITO SUPPLY

Responsibility of Engineers and Contractors for Malaria and Mosquito Nuisances

THAT in construction practice as now carried on, engineers and contractors are frequently responsible for the creation of mosquito nuisances and for the spread of malaria, was pointed out in a report presented to the recent annual convention of the American Public Health Association, by J. A. LePrince, Chairman, Committee on Engineering, National Malaria Committee.

"During the recent epidemic of dengue fever that swept through our Southern States from the Atlantic Ocean to Texas," says the report, "no reference was made by our public press, engineering publications, or engineering societies, to the fact that our street storm-water catch-basins, present by hundreds in many cities and towns, are sources of millions of the mosquitoes involved in mosquito-borne disease. Yet without question a well-selected committee of our American sanitary engineering associations could devise an economical modification for these catch-basins in use so they would become self-draining and no longer a potential or actual menace to the health of the communities where now in use."

Among the suggestions for definite action offered by Mr. LePrince are:

"Obtain the cooperation of the national and state engineering associations, so that a practical plan can be adopted to prevent the constantly changing county highway commissioners and county highway engineers from allowing borrow-pits and roadside ditches to be so constructed that they become intermittent or permanent sources of malaria-bearing mosquitoes and sources of potential foci of malaria.

"Interest consulting and municipal engineers in the mosquito problem and let sufficient of them understand that a relatively mosquito-free community will suffer from heavy mosquito infestation as soon as water of natural drainage courses becomes sufficiently polluted with sewage water; that the production of pestiferous mosquitoes in clear water as against strong sewage-polluted water may be as 1 to 1,000.

"The engineering profession must let the local government officials and the public know that sluggish watercourses in town suburbs are a public nuisance, often the main source of our town mosquito pest problem, and frequently a menace to health. In the malaria belt of our country the normal (non-storm water) flow should travel through a properly devised concrete-lined section on the bottom of the watercourse or by pipe line to a point beyond mosquito flight range.

"Our underground culverts used in place of large pipe and carrying a small normal flow of water should not have flat bottoms. A depressed rounded central channel along the center line of the floor and gently sloping sides will prevent mosquito production. Long culverts with flat grades to convey storm water under town suburbs are yet being built and are sources of our mosquito pest. They are frequently so designed or constructed that it is not practical to prevent mosquito production in them.

"Such small items as the location of municipal swimming pool, recreation park, or auto tourist camp, etc., where no consideration is given to the Anopheles problem near it, can seriously affect the annual malaria sick-rate of the near-by town.

"Most of our practicing engineers, engineering construction corporations, and contractors, have not been taught what a serious problem malaria is. The engineer can build malaria into a community for all time to come, or build it out of a community.

"Which is he going to do, and why?"

Testing Laboratory, Department of Public Works, Allegheny County, Pa.

By Norman F. Brown
Director of the Department

FOR the first time in its history, the county of Allegheny is in a position to know the exact quality of the materials which are going into its roads and bridges and to test the fuels, lubricants, oils, paints and other supplies which are purchased in large quantities by the county. The physical and chemical testing laboratory of the Department of Public Works of the county is now fully equipped and is daily testing samples of concrete, steel, asphalts and paints, this insuring that rigid specifications are being followed by the contractors doing the work and by the companies furnishing the materials.

The application of scientific methods and principles in the selection of material and in the contruction of roads and bridges has become of added importance on account of the great growth of the county's public works and of the necessity of conserving the taxpayers' money, both in the original construction and in maintenance. Modern traffic has necessitated a growth in the mileage of the county roads and an increase in the number of bridges which make it important that improvements be carried out in this manner. Engineers attached to the United States and various state highway organizations are actively studying ways and means of meeting the excessive and severe requirements of modern traffic. This study has to do not only with the materials and their manufacture, but also with the methods of construction. The engineers of the Department of Public Works keep in active touch with the latest information for better and more durable roads, and

APPARATUS FOR TESTING TENSILE AND COMPRESSIVE STRENGTH OF CEMENT, MADE BY PITTSBURGH TESTING LABORATORY, USED IN THE TESTING LABORATORY, ALLEGHENY COUNTY DEPARTMENT OF PUBLIC WORKS, PENNSYLVANIA

ROTAREX ELECTRIC OVEN, ELECTRIC FURNACE, AND SIEVE SHAKER, IN THE PHYSICAL AND TESTING LABORATORY OF THE ALLEGHENY COUNTY DEPARTMENT OF PUBLIC WORKS

the County Commissioners, by establishing the complete road and physical laboratory for the department, are enabling their engineers to design and construct roads and bridges in accordance with the latest engineering information and practices.

Concrete Tests

There are many elements which affect the strength of concrete. The cement, sand and gravel and water which are used in the concrete must be of the right proportions and quality. All these ingredients are carefully tested before being used. County inspectors collect samples of the sand and gravel from the barge and rush them to the Laboratory for testing purposes, and the approval of the Laboratory must be secured before the barges are unloaded or the material is shipped to the various county jobs.

Inspectors visit all county jobs at frequent but unannounced intervals. They carry special field testing equipment which enables them to learn whether the concrete is being mixed with the right consistency. If it is not right, the contractor is notified immediately to alter the mix so as to obtain the correct consistency.

The final conclusive test on concrete is: What loading will the concrete actually bear after it is mixed? Field samples of the concrete just as it leaves the concrete mixer are now taken by the county inspectors on all important county structures. These samples are brought to the Laboratory, cured under proper conditions, and their strength determined by the Riehle testing machine, manufactured by the Riehle Bros. Testing Machine Company, of Philadelphia, the largest machine in the Laboratory.

This powerful machine has a crushing force of 200,000 pounds. Cylinders of concrete 6 inches in diameter and 12 inches long are placed in its mighty jaws and the crushing process started by simply moving a lever. The concrete cylinders are slowly crushed into fragments, the force in pounds when the fracture occurs being carefully noted. Knowing this force and the area of the cross-section of the cylinders, the compressive strength of a square inch of concrete is computed.

Sand Is Tested

To determine the correct grades of sand, a nest of five sieves, one placed on top of another, is used. The sizes of the meshes in these various sieves differ, the coarser-mesh

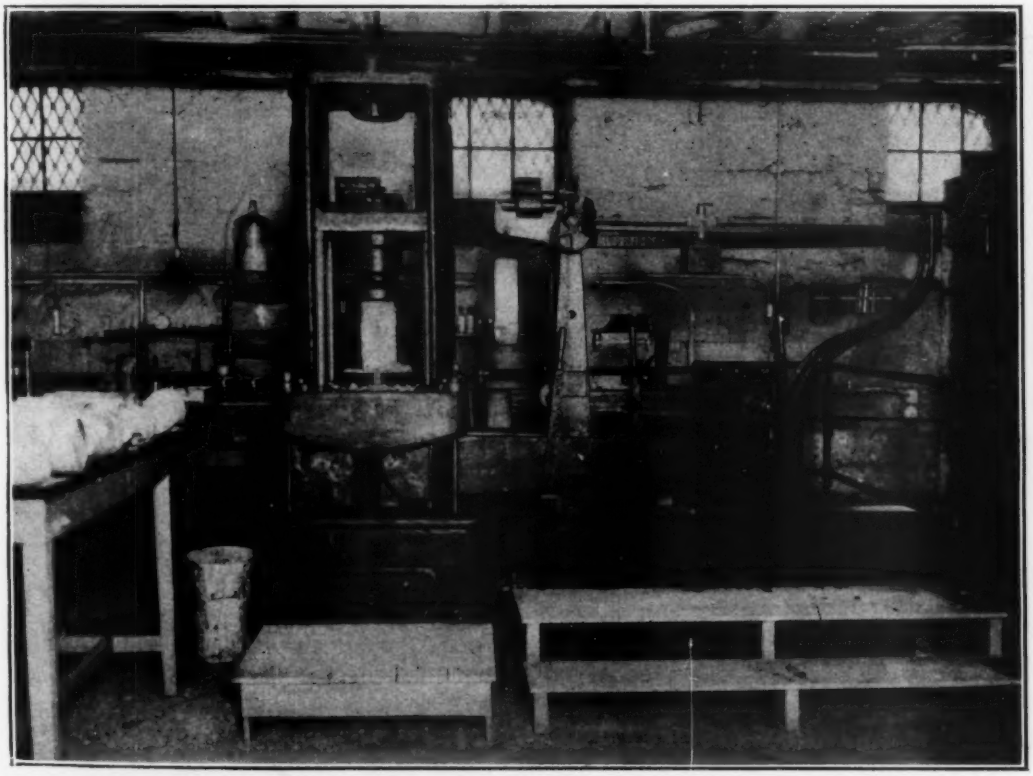
sieve being placed on the top, and the finer mesh on the bottom. A weighed quantity of sand is then placed in the top sieve and the nest violently shaken by the Rotap Sieve Shaker, a machine made by the W. S. Tyler Company of Cleveland, Ohio. This causes the sand to pass through the sieves, each sieve retaining grains of a different size. The sand retained in these different sieves is carefully weighed and the proportions of the various size sands determined.

The sand is also tested for its cleanliness. Much of the sand used in and about Pittsburgh is dredged from the rivers. In the dredging process, fine particles of coal and other deleterious organic material become mixed with the sand. Sand of specified cleanliness is required in order to make good concrete.

How Asphalt Is Tested

Some of the tests are very interesting. One, particularly, made on a black chunk of asphalt pavement, dug out of one of the new county roads, was almost magical in its effect. The piece was weighed and placed in a heavy brass bowl, and a chemical solution was added. The bowl was then placed in an apparatus called the "Dulin Rotarex,' made by The Braun Corporation, of Los Angeles, Calif., and an electric switch started the machine into motion. The chemical solution, together with the powerful centrifugal force established in the machine, separated the piece of pavement into the three component materials which had been mixed together to form it. Black liquid started to drip from a spout on the machine, and when the cover of the bowl was removed, the black chunk of asphaltic pavement had become transformed into a handful of clean sand and crushed stone. The sand was separated from the crushed stone by sieves, and the sand, crushed stone and asphalt which went to form the pavement were carefully weighed to see if they had been added in the proportions that had been specified.

The foregoing is but one test to which the asphalt pavement is subjected. It furnishes an infallible check on quantities used, but this alone is not sufficient. Another test that is made, is as follows: The heavy asphalt is placed in a small brass mould in the shape of a small flattened dumbbell 3 inches long, forming what is called a briquet. The briquet



THE RIEHLE TESTING MACHINE, WITH A CRUSHING FORCE OF 200,000 POUNDS, FOR DETERMINING THE COMPRESSIVE STRENGTH OF CONCRETE

is immersed in water of a fixed temperature and gradually stretched by a delicate mechanism until it breaks. The length to which the asphalt stretches before breaking is measured on a centimeter scale that is attached to the apparatus. This apparatus tests the "ductility" of the asphalt. If not sufficiently ductile or elastic, the asphalt would cause the road pavement manufactured from it to be brittle; and if it is too ductile, the pavement would melt when exposed to heat caused either by the sun or by friction. Asphalt furnished for the county roads is checked by this impartial machine, and no one's personal judgment is accepted.

Oils Are Tested

The Laboratory is also equipped to test the fuel oil, motor oil and gasoline that are purchased by the county.

An apparatus called the Viscosimeter determined the "viscosity" or fluidity of the heavier oils with surprising accuracy and simplicity. Scientific in its principle, it is simple in its operation. It resembles in its process the century-old hour-glass. Oil is poured into a brass cylinder about 1 inch in diameter and 6 inches long. This cylinder is immersed in warm water which is kept at a definite temperature by an automatic thermostat. At the bottom of the cylinder is a small pinhole. The viscous oil slowly flows through the pinhole, and the amount that flows through during a definite period of time determines the "viscosity." If light, it works through rapidly; if heavy, slowly. The important element of this apparatus is the temperature control, as it can be clearly understood that ever-so-small a change in the temperature of the oil alters the speed at which the oil escapes through the hole. The "viscosity" indicates whether the oil can be used without clogging when used as a fuel.

Gasoline Is Tested

The gasoline is tested in a distillation apparatus which has been standardized by the American Society for Testing Materials. In this apparatus, the gasoline is heated and the vapors which are thrown off pass through a condensing apparatus which transforms the vapors back again to liquid form. The temperature at which the gasoline first becomes vaporized is known as the initial point; the temperature at which the gasoline has been completely vaporized is known as the end point. The initial point and the end point, together with the immediate temperatures, furnish a method of judging the quality and volatility of the gasoline.

Personnel in Laboratory

P. J. Freeman, Chief Engineer in the Bureau of Tests and Specifications, who has charge of the county's Laboratory, was born at Lilly Chapel, Ohio, in 1881. He received his technical training at the University of Illinois, obtaining a Bachelor of Science degree in 1907 and later the degree of Mechanical Engineer. From 1907 to 1910 he was in the Mechanical Engineering Department of the University of Pennsylvania, and from 1910 to 1912 was identified with the Mechanical Engineering Department of the University of Illinois. From 1916 to 1923 he was Engineer of Tests with the Pittsburgh Testing Laboratory of this city. Previous to his engagement with the county, Mr. Freeman was conducting a consulting engineering office of his own. He is a member of the leading technical societies of the country and has published a number of technical articles, principally on concrete materials and methods of testing them.

Associated in the department with Mr. Freeman, is Major C. B. Shaffer, as Engineer of Tests. He is a graduate Civil Engineer of the University of Delaware. Carl W. Betz is the Laboratory's Chief Chemist. He received his technical training in the University of Missouri, obtaining there a Bachelor of Science degree in 1917. P. E. Carr, H. J. Zimmer and E. W. Bauer are the Laboratory's testmen. Joseph Atkinson is test clerk and David Walters is laboratory assistant.

Pennsylvania Has State-wide Housing Shortage

A SERIOUS state-wide housing shortage in Pennsylvania is indicated by the findings in a survey of 105 municipalities in this state recently completed by the Pennsylvania Housing and Town Planning Association. It is estimated that the state needs over 50,000 additional homes or accommodations for approximately 250,000 people at the present time. At a conservative estimate of $5,000 per house, the housing needs represent a building program of $250,000,000.

It is significant that 80 per cent of all cities reporting indicate a shortage of single-famliy dwellings and that cities under 25,000 population report more uniformly a shortage of homes than the larger cities. The greatest existing building need continues to be for small single-family dwellings at prices ranging from $3,500 to $5,000.

The report also shows that 83 of the 105 cities covered show an increase in rent ranging from 5 per cent to 115 per cent, within the past four years; 8 show an increase of 100 per cent, and the average for the group is 40 per cent.

Copies of the report may be secured from the Association, 311 South Juniper Street, Philadelphia, Pa.

Snow Sculpture

By C. H. English

Director, Bureau of Recreation, Board of Education, City of Chicago

FOR generations boys and girls have fashioned the traditional snow-man and fort during the winter season when sufficient snow has fallen and is damp enough to pack.

Last winter, in Chicago, there was plenty of snow. The Department of Playgrounds, under the Board of Education, held a unique contest among the boys and girls at the sixty playground centers. The general rules issued by the Director can be summarized as follows:

1. Make from snow any object you desire—but do not use the old snow-man idea.

2. Take a picture of your results and send to the office.

That wasn't much in way of suggestion. We too frequently try to give children too many suggestions. The results in this event were amazing. Every sort of animal—elephants, wolves, alligators, dogs, cats, seals, Spark Plug, etc., overstuffed furniture, battleships, an igloo, houses, fireplaces, etc.—was made by the children. They did so well that the Director decided to put the youngsters to the supreme test.

School was to be dismissed on Lincoln's

birthday. That gave us a big opportunity to do something for our greatest Illinois citizen. So down-town, just south of the Art Institute and facing Michigan Boulevard, in the very heart of Chicago's Loop District, twelve playgrounds sent representatives to model Abraham Lincoln or some other object. A thirteen-year-old girl sculptured Lincoln's head. The boys had built an 8-foot figure. This girl had never attempted a thing of this sort before, yet the thousands who saw it recognized the representation. George and Martha Washington were also modeled. Several animal groups were scattered along the Boulevard. The work was so well done by these elementary grade children that many thought it was the work of the art students of the near-by Art Institute.

During the process of making snow figures, we developed some new technique. Do we wait until the snow packs? We do not. In fact, this elephant in the picture was finished in 18° below zero. Here is the method:

1. Use boards, sticks and wire for supports to legs, arms, etc.
2. With buckets filled with water, fill with snow until you have an icy slush.
3. Apply this, and shape with paddles, trowels, knives, etc., before it sets and freezes.
4. Smooth off edges with hatchets, knives, etc., or, to get hair effects, use wood rasps.
5. Where figure needs outline, as in the case of Spark Plug, use ordinary oil paint and brush.
6. If you are anxious to get color effects, use a pasty consistency of kalsomine, applied by brush. The water freezes, leaving the pigment on the surface.

In getting pictures of the results, be sure to have a black background, or else the picture will not turn out well. School buildings are usually good, but even a dark cloth will serve the purpose.

Because the playgrounds are located all over Chicago, it would be impossible for judges to visit them all. So the picture record was used. Our great Chicago sculptor, Lorado Taft, decided upon the elephant group as the best. People from all over the city came to see it. Street cars slowed down during the first two or three days so that passengers might observe the work of these forty children.

This winter, no doubt, we shall have some remarkable groupings. In turning the snow into ice, the objects can be worked upon over a period of days, providing the weather remains below freezing. Besides "figure" sculpturing, we are going to attempt portrait and scenic painting of snow. After the "bank" is prepared and the frame painted, the shadow effects will be gained by different elevations in the surfaces and the colors filled in.

Some one might well say, "Can children in the grades do these things?" We should share in your misgivings if it were not for the fact that we have seen them do it. There is no limit to the development of this winter activity. It will grow with us each year. You offer the stimulus and watch what the boys and girls will do.

Nation-wide System of Public Employment Offices Recommended

THE establishment of a nation-wide system of public employment offices, to be operated by the Federal, state and local governments, with the assistance of a national advisory council and local committees representing employers and employees, is recommended in a report on "Public Employment Offices—Their Purpose, Structure, and Methods," recently issued by the Russell Sage Foundation. This report, which is based on a five-year study extending into almost every state in the Union, and into Canada and England, reviews the various methods by which workers now get jobs and employers get workers, and draws the conclusion that these methods are inadequate to the needs both of industry and of the workers. All of the existing employment agencies combined meet only part of the need and they leave the employment service demands of many important sections of the country and some important industries entirely undeveloped.

Public sentiment favorable to a public employment service has been increasing for twenty years or more, the most important reasons for this sentiment being the belief that an efficient public employment service will tend to eliminate the abuses of private fee-charging agencies and that it will reduce the evil of unemployment. The report traces the history of our experience with municipal, state and Federal administrations of public employment offices, and finds that the evidence is strongly in favor of making the state the chief unit of administration in a combined Federal-state-local service.

In making the report public, Shelby M. Harrison, Director of the Department of Surveys and Exhibits of the Foundation, under whose direction the report was prepared, said: "The solution of the employment problem depends very largely on the ability of the staff in each local office—and there would be a hundred or more of such offices in the proposed service—to discover as intelligently as possible the exact requirements of the job which the employer wants filled, and the capability and adaptability of the individual worker applying for this job." It is pointed out that no system of character analysis by which applicants for employment may be selected has yet produced results which justify its adoption or even suggest its trial in a public employment office.

Copies of the report may be secured from the headquarters of the Foundation, 130 East 22nd Street, New York City.

A Municipal Tax Barometer

By Charles E. Doell, C. E.

Secretary, Board of Park Commissioners, Minneapolis, Minn.

SO often has the rise in municipal taxes in recent years been compared unfavorably with the rise in population, assessed valuation, tax rate, etc., that a wide-spread public impression has been created that municipal taxes are soaring out of all proportion to what is sane and reasonable. In order to correct this impression, the accompanying graph, showing the rise in bank clearings as a more exact barometer of the rise in taxes, is presented.

Taxes need not vary as the population, because the cost of commodities and the people's desire to spend money may vary out of all proportion to the population. In fact, population and total taxes are not akin.

Tax rate and assessed valuation are poor barometers, because each is only a factor in determining taxes. The rate may be low but the taxes high; the valuation may be high but the resultant tax low.

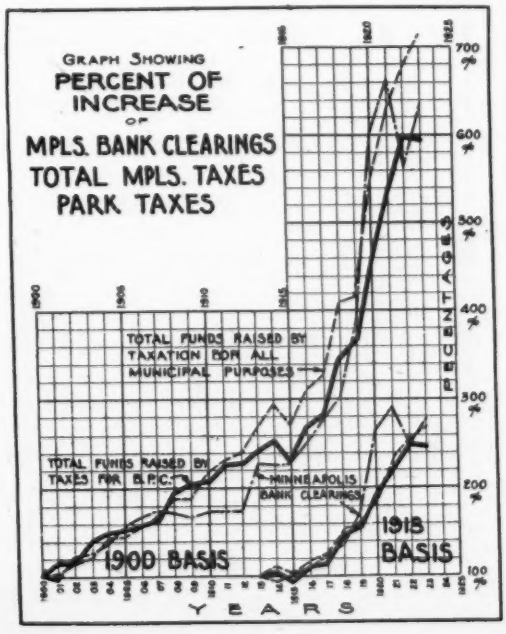
Bonded indebtedness fails as a measuring stick for the same reason that the others do —there is no relation. One could as wisely use the area of the city or the number of municipal golf courses.

Bank clearings, however, are an indication of the money being spent for all commodities, including taxes. Taxes—not tax rate or assessed valuation, but money actually spent for taxes—will vary somewhat as the money spent for all things, unless the relative amounts spent for various commodities are changed. Of course this is what the citizen says is happening now—that relatively more money is being spent now for taxes than, say, 20 or 30 years ago. The public official contradicts this statement, but heretofore has had some difficulty in proving his point. The accompanying graph may help him—it has helped Minneapolis. It makes a comparison of the actual amount of money raised by taxation, and of the amount of money being spent for taxes and all other commodities, as reflected by the Minneapolis bank clearings—a proper, logical and fundamental comparison.

The 1923 figures show the total municipal taxes as 712 per cent of the 1900 figures, Board of Park Commissioners taxation as 596 per cent, and bank clearings as 631 per cent of the 1900 figures. The three curves, in a general way, parallel each other very closely the entire 24 years. Some years the bank clearings are above the taxation curves, and other years the taxation curves are above those of the bank clearings. The reason for the divergence of the curves as time goes on is that the figures involved in the later years are much larger than in the earlier years and, consequently, any reasonable difference in the later years makes an increasingly larger percentage difference when based on the comparatively small figures of 1900.

The foregoing figures would indicate that taxation for all municipal purposes was higher than that which the bank clearings would indicate to be reasonable. However, this comparison is assuming that the relationship between taxation and bank clearings in 1900 was ideal. There is nothing to prove this point of view. The year 1913 could just as well be taken as a basis (and it is often taken as a basis for pre-war figures), in which case the total municipal taxes of 1923 would be 266 per cent of the 1913 figures, park taxes 246 per cent, and bank clearings 276½ per cent. In fact, if any year between 1908 and 1919 had been taken as a basis, the relative position of the curves would be the same.

The Board of Park Commissioners' tax



curve between the years of 1900 and 1910 very closely coincides with the total municipal tax figures, but from 1910 on there is a continual divergence of these curves, the park taxes being the lower. This indicates simply that the various factors in the total municipal budget did not bear a definite ratio to each other, which is only reasonable, as several new boards and commissions were introduced into the city government after 1910, such as the Civil Service Commission, Board of Estimate and Taxation, the Municipal Pension Board, the Planning Commission, and others.

Why, then, this almost national cry against the amount of municipal taxes? Bank clearings took a decided slump in 1922 and dropped from a position relatively above taxes to one below taxes. While, relatively speaking, it was easy to pay taxes in 1920 and '21, it was not so easy (though not difficult) in 1922. Most people live more like grasshoppers than bees and ants; they do not store up in fat years to take care of lean years, and, consequently, the shoe pinches when conditions change from the favorable to the normal—and hence the citizen rises to declare the injustice of exorbitant taxes. But the cost of government cannot fluctuate so rapidly and, consequently, taxes steer a medium course. Bank clearings rose materially in 1923, will increase some in 1924, and with the expected business revival of next year, should make quite a stride upward in 1925. It will again be easy to pay taxes, the citizens will want more governmental service, and the cycle will start all over again.

Zoning Publicity Which Proved Effective

By L. Glenn Hall

WITH the entry of Boston into the rapidly growing ranks of cities in the United States that have adopted modern zoning laws to regulate the erection of buildings in appropriate districts and to insure reasonable open spaces between buildings, the zoning movement throughout the country will no doubt receive an additional stimulus.

THE CITY PLANNING BOARD
30 CITY HALL
BOSTON, MASS.

TEN POINTS ON WHAT ZONING DOES.

1. ZONING divides the city into districts, according to the most suitable and valuable uses for each district; based on existing conditions and future needs and regulates the location and use of new buildings.
2. ZONING makes provision for ample *general business districts* in suitable locations in which industrial plants may not impair the business environment.
3. ZONING places suitable land in *industrial districts* where the best of transportation facilities by rail, water and highway may be secured and factories may easily expand without tearing down expensive buildings.
4. ZONING provides *unrestricted districts*, suitable places for those heavy industries such as stockyards, boiler works, coke manufacture and other industries that would be objectionable elsewhere.
5. ZONING regulates the *heights of buildings* appropriate to their use, so as to provide an equitable distribution of light and air for all; minimizes overcrowding of people and relieves traffic congestion.
6. ZONING provides *local business districts*, conveniently located near residential neighborhoods, where stores will be concentrated instead of being scattered everywhere.
7. ZONING protects the comfort, convenience and quietness of *residential districts* by excluding stores, public garages, laundries, factories and other business and industrial uses.
8. ZONING establishes *uniform building lines* in residential districts to assure an equal amount of light and air and access for all residences.
9. ZONING provides adequate light and air by *side and rear yards* around every building in the suburban residential districts and establishing the *percentage of area of a lot* that may be occupied by buildings.
10. ZONING preserves the home character of *single and two-family residence districts* by segregating types of residences into districts where they are appropriate.

Zoning went into effect in Boston on June 5 of this year, when Channing H. Cox, Governor of Massachusetts, signed the bill which had been before the Legislature for five months. The Boston law is unique, in that it is probably the only zoning law in the United States to be passed by a state legislature. This came about on account of the peculiar relation that has always existed between Boston and the Commonwealth. The Boston building law, which is closely related to zoning, is also a legislative act; and since the city government could not modify action already taken by state authority, it was necessary to take the zoning measure to the Legislature for enactment, rather than to the City Council. Outside of Boston, other Massachusetts municipalities may pass zoning ordinances under authority of the state enabling act of 1920.

The public presentation and publicity of the plan began when the bill was sent up to the Legislature. The newspapers of Boston were the chief medium of publicity. Most of the information on zoning was published as live news. Several papers reproduced the zoning maps. In addition to the preliminary draft of the law with a tentative colored zoning map of the city, the Planning Board also prepared and issued a number of pamphlets explaining the proposed plan.

Three public hearings were held at the City

Hall by the Planning Board and Zoning Advisory Commission. The hearings were advertised in bold face type on the front pages of the newspapers. Introductory addresses were made by members of the Board and Commission, and the plan was explained in detail by the Zoning Director, Arthur C. Comey, with the use of lantern slides. A number of the zoning survey maps were on display. Copies of the proposed law, together with the explanatory literature, were distributed.

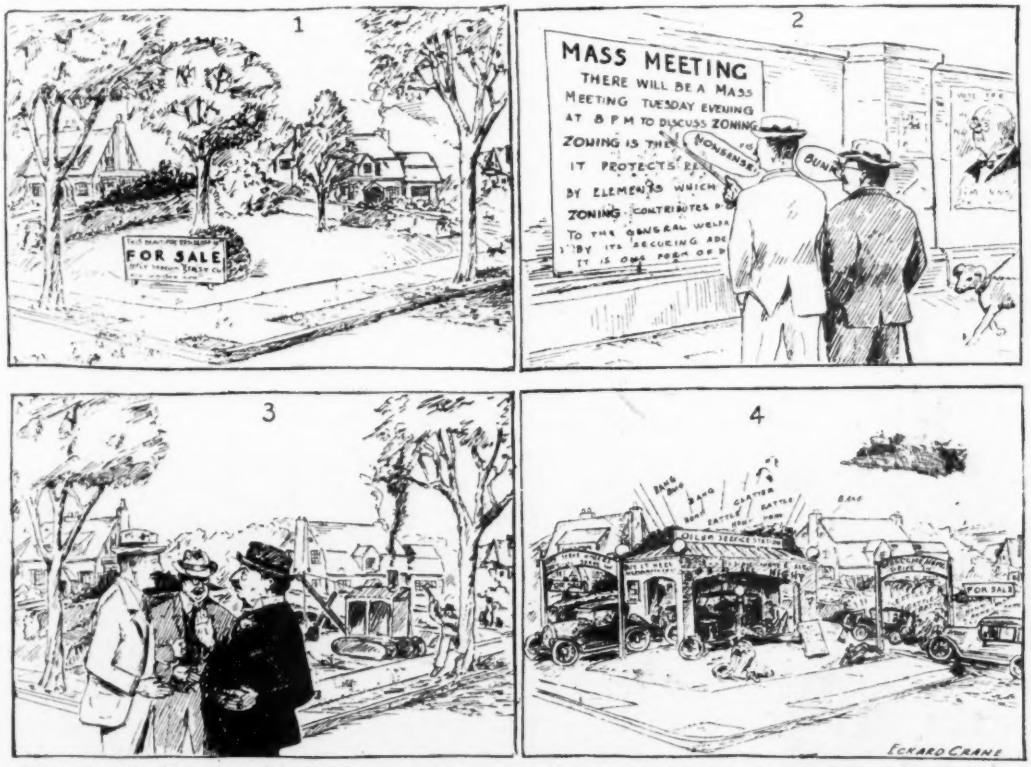
Two public hearings were held at the State House by the legislative committee in charge of the bill. Different phases of the proposed plan were clearly set forth by members of the Board and Commission, city officials and others. The chairman of the Planning Board, Frederic H. Fay, was in charge of the presentation, and those in favor of the bill spoke according to a well-arranged program.

During the five-months' period from the date of filing the bill until its passage, members of the Board and Commission and of the technical staff spoke before various civic, business and neighbor-organizations. A Speaker's Zoning Manual was prepared, containing the proposed law, maps and explanatory material compiled in the office of the Board.

Probably the outstanding features of the zoning of Boston are: (1) that the law was enacted by the State Legislature; (2) careful drafting of the act, based on accurate studies on the ground and in the office; (3) simplicity and directness of its provisions; (4) convincing, but not elaborate methods of presentation and publicity.

If a city almost three hundred years old does not think it too late to adopt a comprehensive zoning plan, then the many newer cities in the United States that are not yet zoned can with profit to themselves study the splendid example Boston has set.

AN UNWELCOME NEIGHBOR MOVES IN!



This is the story of a corner lot offered for sale in a quiet, residential neighborhood of an unzoned city. Smith and Jones, friendly neighbors, own the two homes adjoining the lot. On their way down town one morning they are attracted by a bulletin announcing a mass meeting to consider a zoning plan for the city. In their complacency they voice their disapproval of zoning as an "unnecessary idealistic scheme of a bunch of reformers." A few days later they are surprised to find that the purchaser of the lot has leased the property to an oil company for a filling station. Smith and Jones protest in vain against the intrusion of such a nuisance, but the purchaser contends that he has the right to use his own property as he desires. The noise and odors from the service station finally result in the disposal of the two homes at a sacrifice, and incidentally Smith and Jones are among the strongest supporters of zoning at its adoption by the city a few months later. They buy their future home sites in an unspoiled suburban section, and now, with the protection which zoning affords, they feel secure against similar invasions

Chamber of Commerce Activities in Public Affairs

"Say It with a Home and Raise Your Own Flowers"

GARDNER, MASS.—"Say it with a home and raise your own flowers," is no idle boast in the city of Gardner, Mass., where a unique plan, in operation since the spring of 1921, has supplied hundreds of families with homes which they now own and are gradually but surely paying for.

Through the Gardner Chamber of Commerce, 106 business men of the community have signed an agreement running for three years and not binding upon their heirs in any way, whereby a committee, elected by them, endorses home owners' notes and accepts as security a second mortgage upon a home. Of course, the committee looks very carefully into the moral character, earning power and family expenses of the applicant for a loan, and provided he has 10 per cent to invest, endorses his note, which can be accepted either by a savings bank or a trust company. There is no inherent reason why a national bank also could not accept these notes; but they run for a period of four or five years, making a type of loan which national banks do not solicit. The business men's Housing Endorsement Committee stipulates what payments toward principal shall be made monthly, which are cared for by the bank holding the note, along with interest monthly in the regular method of collection.

The Gardner Chamber of Commerce makes no profit upon the scheme nor are any bonuses asked. The money is available at the current rate of interest, and the scheme, which is original in this city, has produced results which are more homes. It might be said that the plan has given encouragement to those who felt they could not finance a home for what was available to them through a first mortgage. Up to October 1 of this year $500,000 worth of houses have been built in Gardner. This is quite a figure for a city of only 20,000 people.

Take a sample case of a new home built to sell for $6,000 and worth this figure. Under Massachusetts law a savings bank can loan 60 per cent, or $3,600, on a first mortgage; $600 is invested by the purchaser, and our Housing Endorsement Committee grants a second mortgage of $1,800. We hold the mortgage as security and endorse the borrower's note, which is accepted either by a savings bank or a trust company.

In the case above we might ask payments towards principal of $25 a month, but we always insist upon the payment of interest monthly. Collections are made through the bank which holds

THESE HOMES WERE BUILT UNDER THE HOUSING PLAN OPERATED BY THE GARDNER CHAMBER OF COMMERCE

the note. The plan works equally well with a cooperative bank first mortgage, except that the payments which we should ask would be considerably smaller.

Efforts are continually made by the Endorsement Committee to weed out the speculative builder. In this connection the purchaser has to live in the house, and only one- and two-family dwellings are ever considered. The house that has been occupied for six months is not, in the eyes of the committee, a new house, and if by any chance the property is sold, the second mortgage is required to be paid off. Thus the would-be speculative trader in houses is thwarted at the beginning.

During the last four years since the Gardner housing plan has been in operation, not one cent of loss has been incurred. Every borrower has made his interest and installments towards principal promptly; and if we have any guess, they are thankful for the accommodation. In the operation of this plan the Gardner Chamber of Commerce has dedicated it to the service of the average man who wants to own a home, and we feel that in this respect we have been very successful.

Others may speak long and loud for their housing corporations, which sometimes build the wrong types of house and thus fail, but we are very well satisfied with our plan, which assumes in the first instance that the prospective owner has selected the house to his liking; then by the aid of a second mortgage we make it possible for him to finance it.

Copies of the agreement and other data are on file at the Gardner Chamber of Commerce and will be supplied to anyone upon application.

TUDOR W. BRADLEY,
Manager, Gardner Chamber of Commerce.

The Canton Scholarship Foundation

CANTON, OHIO.—The problem of financing the education of worthy boys and girls who desire to continue their studies after graduating from high school but are unable to do so unless they receive financial assistance, is being grappled with by a group of Canton, Ohio, men and women who have organized the Canton Scholarship Foundation for the purpose of helping young people finance their college work. This Foundation was formed after considerable study had been given the question, and was incorporated on December 4, 1922. Four young people are now in college who have been aided by the Foundation funds. Others will be helped as the Foundation grows.

Membership in the Foundation is composed of individuals who make an initial contribution of $10 and who continue to contribute at least $5 per year; of organizations which make an initial contribution of at least $50 and which continue to contribute at least $50 per year. Persons contributing $1,000 or more are made life members without further payment of dues. Though less than two years old, the Foundation has now more than $3,000 in fund, and this is being added to rapidly. Money loaned to students is paid back after graduation and all notes given as evidence of loans bear interest at 5 per cent per annum from date of graduation or leaving school.

Each applicant for a loan is required to answer an extensive questionnaire relative to his past school record and his intentions. The applicant must be a student in or about to enter a regular course, having met entrance requirements, and must have declared his purpose to complete such a course. Aid from this Foundation is not given special students. A special selection committee of five members, not more than two of whom may be members of the Foundation trustees and not necessarily limited to members of the Foundation, consider all applications and decide upon those who are to receive aid. The decision of this committee is final.

A large number of individuals and organizations are members of the Foundation, the Board of Trustees of which is composed of prominent men and women of the city. While the growth to date has been slow, it has been steady and is gradually gaining. Plans are being made to greatly increase the Foundation's resources through the addition of many new members.

GUY CLEMMITT,
Publicity Manager, Canton Chamber of Commerce.

Industrial Safety Program Inaugurated

WESTON, W. VA.—As a means of promoting safety activities among the employees of the industrial plants of this city, the Weston Chamber of Commerce recently organized an Industrial Safety Council composed of the superintendents and foremen of the various plants. The present plan is to hold a dinner meeting of the Council once a month, and to arrange for lectures at these gatherings by competent speakers on safety work as applied to industries. We also intend to extend the interest and value of the programs by including discussions of fire hazards and first aid work.

The expenses incurred by these meetings will be borne by the manufacturing concerns, a satisfactory agreement having been made whereby each concern will pay a specified rate for each of its representatives in attendance.

This is the first time that an industrial safety program of this kind has been conducted in Weston. The keen interest in our plans already shown by the members of the Council is most encouraging, and we believe the scheme will produce good results.

FRANK H. SHAFFER,
Secretary, Weston Chamber of Commerce.

Freeing the Streets from Protruding and Unsightly Signs

NEW YORK, N. Y.—One of the outstanding results of Fifth Avenue's recent centennial celebration is the increased public realization that Fifth Avenue's preeminence as one of the world's finest streets is neither accidental nor entirely a natural growth. The general public is going to realize more and more that the stateliness and dignity of the avenue are carefully planned and as carefully and vigilantly watched.

The absence of protruding, illuminated or unsightly signs on Fifth Avenue is a typical example of how "the street with a government" conducts its affairs. When The Fifth Avenue Association first broached the idea that signs on the avenue should be regulated by law, there were many to say that it was undesirable, that such a thing could not be accomplished, and that it would kill business. Today, those who most openly opposed these principles are the warm supporters of the Association's activity.

An amendment to the city's Code of Ordinances was secured, limiting protruding signs on Fifth Avenue to a distance of one foot from the building wall, thus virtually making any projection impos-

COMPARE THE DIGNIFIED, ATTRACTIVE FIFTH AVENUE BLOCK WHERE SIGNS ARE RESTRICTED, WITH THE UNSIGHTLY VIEWS PICTURED ON EITHER SIDE

sible, and prohibiting entirely the erection of illuminated signs. So successful was this ordinance in restraining undesirable business practices and in promoting the avenue's desirability as a shopping and hotel center, that the business firms and property owners in Madison Avenue and 57th Street requested the Association to take similar action in their behalf. To-day, these streets stand apart from other streets of the city because of their unique commercial beauty. The ordinance was also extended to 34th Street between Lexington Avenue and Seventh Avenue through the efforts of our Association and the 34th Street Midtown Association.

There is now pending before the Board of Aldermen an amendment to this ordinance, presented by the Association on behalf of over 1,000 first- and second-floor business establishments in the cross-town streets between 34th and 59th Streets, east and west of Fifth Avenue. These merchants have recognized the fact that in actual practice a multiplicity of protruding and electric signs serve to defeat the very purpose for which a sign is erected. A merchant who erects a protruding sign only to find his neighbor following his example and hiding his sign from view, is soon convinced that this method of advertising has little, if any, value. On the other hand, he sees his street robbed by these unsightly obstructions of any semblance of real business character. The merchants of the Fifth Avenue section hope that within the near future not only the prominent thoroughfares, but every street in the Fifth Avenue section, will be free from these eyesores.

Throughout the year our Association aids the Department of Public Works in the enforcement of the sign ordinance. Constant inspections reveal violations, which are called immediately to the attention of the owner; if no action is taken as a result of this friendly reminder, the matter is reported to the department and summary measures instituted.

Removal notices, "For Rent" signs, sale announcements and other signs that, while within the law, are unsightly and detrimental to the civic beauty of this section are also the subject of daily inspections. The removal of many of these has been secured by explaining to the owners the disadvantages of such a practice to the Fifth Avenue section and to the individual business establishments. The cases in which cooperation is not forthcoming after a proper explanation of the Association's attitude and desire to protect every one, including the owners of the signs themselves, are very rare indeed.

WILLIAM J. PEDRICK,
General Manager, The Fifth Avenue Association, New York.

Welcoming New Americans to Citizenship

LINCOLN, NEBR.—With a luncheon and an impressive patriotic program, the Lincoln Chamber of Commerce recently welcomed into citizenship 58 men and women of this city on the day upon which they received their final naturalization papers. This is the first time that such an event has been formally observed in Lincoln. The celebration, which was designed to convey to the new Americans the full significance of the step which they had taken, was in line with the Americanization movement now being fostered by the American Bar Association through its citizenship committee, of which County Attorney Charles E. Matson, Chairman of the Chamber's Committee on Citizenship, is a member.

After having received their naturalization papers at the Lincoln court-house, the new citizens were escorted by a group of fifty members of the Chamber to a luncheon prepared in honor of the guests. As the group entered the dining-room, a bugle sounded from the balcony and a soloist dressed in the costume of Columbia sang "The Star Spangled Banner," while a detail of Boy Scouts slowly raised a large American flag behind the singer. Each of the guests wore a badge of the national colors surmounted by a medal showing, in bas-relief, a view of the new Nebraska capitol. These medals were a gift of the Chamber.

Two naturalized American citizens, each noted for his patriotism and public spirit, were the principal speakers of the occasion, and in their addresses they pointed out the opportunities and the

duties of the estate that had just been conferred upon the guests, and urged the new Americans to take part in community activities as one means of making themselves citizens in fact as well as in name.

W. S. WHITTEN,
Secretary, Lincoln Chamber of Commerce.

Publicity Methods Which Brought Out the Vote

FLINT, MICH.—The successful work done by the Flint Junior Chamber of Commerce in its campaign to get out the vote last fall, while it had special reference to the national election, may offer helpful suggestions to chambers of commerce and other organizations interested in promoting bond issue and other local campaigns.

The decision that the Junior Chamber should assume the responsibility of a campaign to give Flint a record vote at the November election was made by the Board of Directors at a meeting on July 25 last. Realizing that the success of this effort rested upon whether or not the eligible voters registered, the Junior Chamber members immediately set to work to secure the registration of the voters before August 23, the closing date. Four committees were appointed to handle the four divisions of work—publicity, finance, zoning, and speakers—and they launched at once into their respective duties so that the campaign was well under way within a few days. The drive was absolutely non-partisan, the main object being to get every one with the right to vote to use that right.

Many effective publicity stunts were put through in the effort to bring the people finally to the polls. For instance, ten thousand bright-colored cards bearing the warning, "Your Vote Is at Stake—Register Now," were enclosed with the canceled checks and statements of all banks in the city. One of these cards is reproduced herewith, together with one of the "Register Now" stickers, five thousand of which were pasted on correspondence, on wind-shields of automobiles, and in various other places. Fifty large posters were placed on the front of local street cars, and cardboard placards were distributed among the large department stores and mercantile houses. Six rubber stamps bearing the slogan of the campaign, "Register Now," were used in stamping all literature on sale at news-stands and other public places. As the registration date drew near, a final effort was made by placing 24,000 stickers, each the size of a postage stamp, on the tops of milk bottles, and 12,500 similar stickers on bread wrappers.

As a result of the drive, the largest registration in the history of the city was brought forth. Approximately 5,000 more people registered than at any previous time, and it became necssary to redistrict the city to the extent of adding thirteen new precincts.

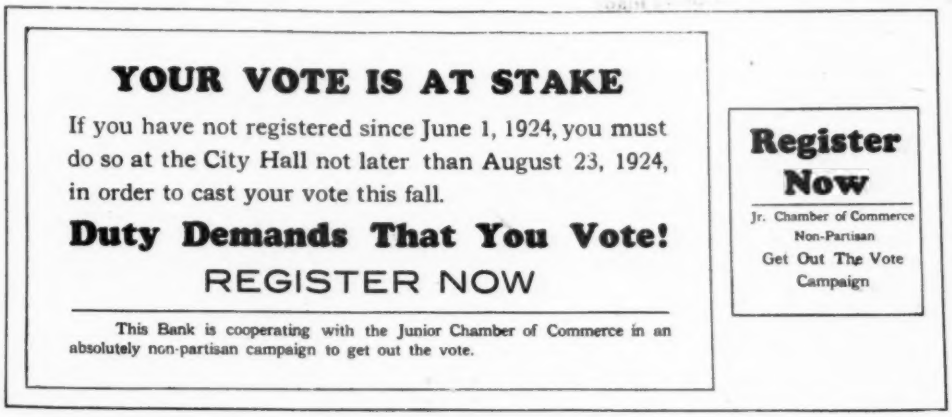
The next step was to get the people to vote at the primary election on September 9. Similar methods of publicity were used, in addition to stenciling the sidewalks with the message, "Vote September 9."

The new precincts created somewhat of a problem, for the voters in many cases were not acquainted with the locations of their new voting booths. To surmount this difficulty, the Junior Chamber maintained a telephone information bureau through which voters might find out the exact location of their particular polling stations. This service was maintained for three days preceding the primary election, and slightly over 7,300 calls were answered.

The final test of the success of the campaign came in the effort to bring out the vote at the national election. Small leaflets containing information on the previous Presidential election were distributed with theater programs; stickers were distributed by Boy Scouts to automobile owners, with the request that they place the stickers on their wind-shields; and the Junior Chamber Glee Club sang a new song entitled "Get Out and Vote" at all the luncheon club meetings just preceding the election.

These publicity methods planned by the committee men, together with the fine cooperation of the local newspapers, resulted in the largest vote ever cast in Flint. Much credit is due the local League of Women Voters, which joined the Junior Chamber in making a house-to-house canvass to personally ask the citizens to vote. This personal contact proved an important factor in bringing the people to the polls.

ELTON W. VIETS,
Manager, Junior Chamber of Commerce.


YOUR VOTE IS AT STAKE
If you have not registered since June 1, 1924, you must do so at the City Hall not later than August 23, 1924, in order to cast your vote this fall.
Duty Demands That You Vote!
REGISTER NOW
This Bank is cooperating with the Junior Chamber of Commerce in an absolutely non-partisan campaign to get out the vote.
Register Now
Jr. Chamber of Commerce
Non-Partisan
Get Out The Vote
Campaign

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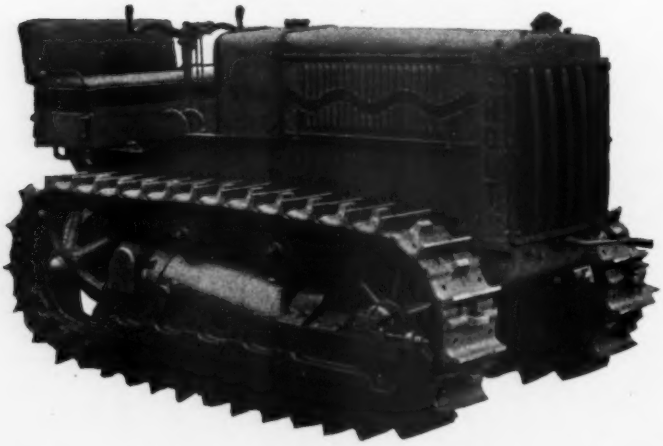


Strengthening a strong line---the New 5-ton "Caterpillar"

Some Special Features

Simplicity with increased efficiency, obtained through careful engineering.

Low center of gravity—a compact tractor, the length, height and width correctly proportioned to its weight of 10,400 lbs.

Three unit construction, viz: Motor unit, transmission unit, track unit.

Complete accessibility combined with fullest dirt-proof protection.

Holt valve-in-head motor, fully enclosed, with gear driven fan and pump with ample reserve power.

Full force feed oiling system insuring perfect lubrication on the steepest grades.

Three speed, selective type transmission with the most practical combination of road speeds for all classes of work. Operates smoothly at all speeds and under all loads.

All shafts and gears of special alloy steel, heat treated. Track links of special heat treated steel, providing the greatest mileage and durability. 61% of the tractor's weight is heat treated by special processes in our own furnaces.

Correct flexibility of tracks is obtained through a proper pivoting track release, full three point suspension and spring mounting, insuring maximum traction under all conditions.

A good product made better—that describes the New 5-ton "Caterpillar." It incorporates all the efficiency and superior qualities continuousuly displayed by the 5-ton "Caterpillar" since 1917; and it possesses new qualities and mechanical features exclusively Holt, unapproached by any other make or type of tractor.

The New 5-ton "Caterpillar" is a product of experience; thoroughly tested by Holt engineers and users under the most gruelling conditions.

Here, then, is a complete line of outstanding quality in power equipment—the New 5-ton "Caterpillar" for all medium power needs; the 3-ton, rugged and agile, for lighter tasks; the great 10-ton, supreme in all heavy duty fields.

"Caterpillars" are used by cities, towns, villages, counties, states, for grading, road maintenance, snow removal and other public works.

In hundreds of cities, counties, townships throughout the country where "Caterpillars" are being used, taxpayers commend their public officials for their wise choice of power equipment; because they know that for rugged power, positive traction and lasting quality, the "Caterpillar" is unexcelled. They deliver satisfaction, save time and make the taxpayer's dollar go farther.

Our new booklet contains interesting information about the 2-ton, 10-ton and the New 5-ton "Caterpillars." Copy will be sent upon request.

The Nation's Road Maker

There is but one "Caterpillar"—Holt builds it.

THE HOLT MANUFACTURING COMPANY, INC.
PEORIA, ILLINOIS **STOCKTON, CALIF.**

Export Division: **200 W. 54th Street, N. Y.**

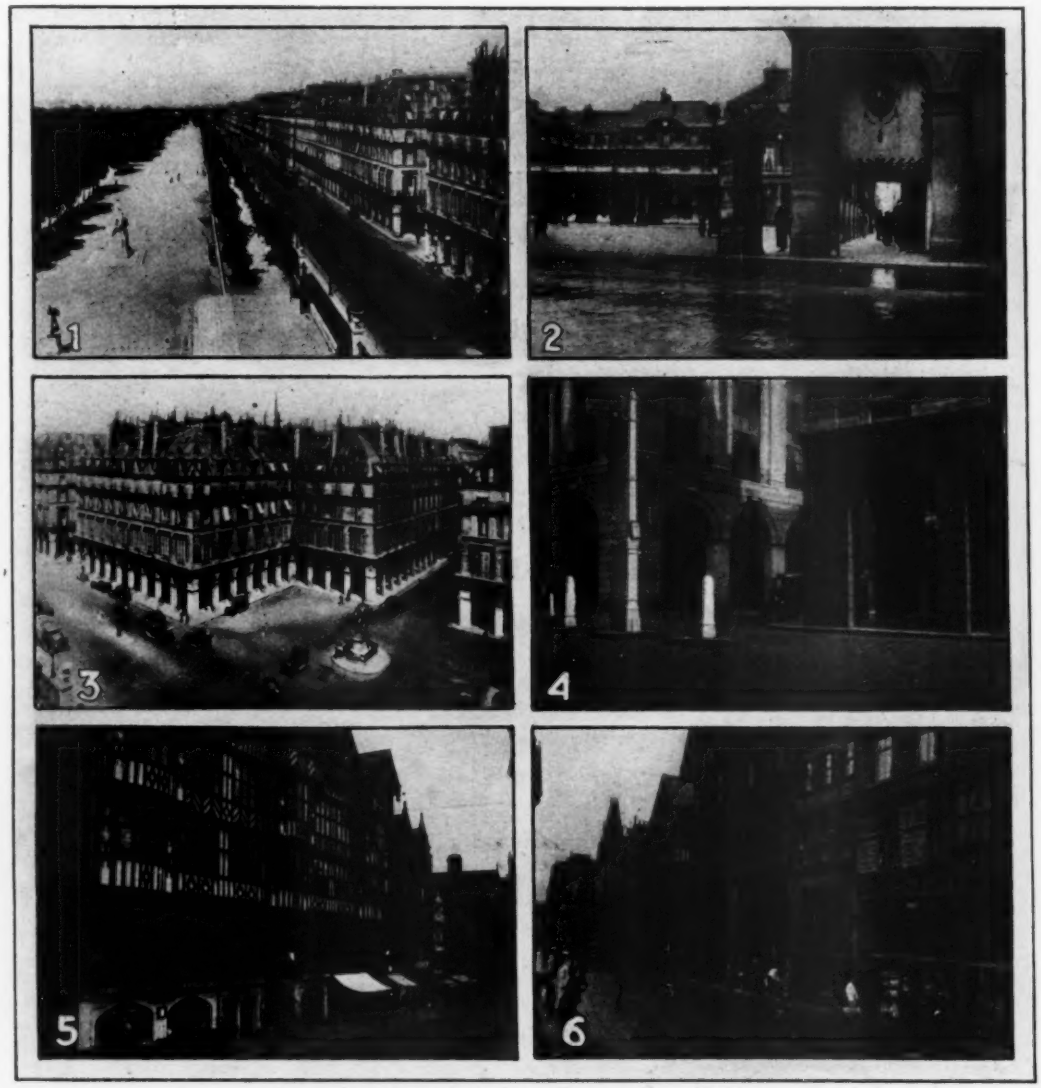
CATERPILLAR
Reg.U.S. Pat.Off.

Sidewalk Arcades for Traffic Relief

By Arthur S. Tuttle

Chief Engineer, Board of Estimate and Apportionment, City of New York

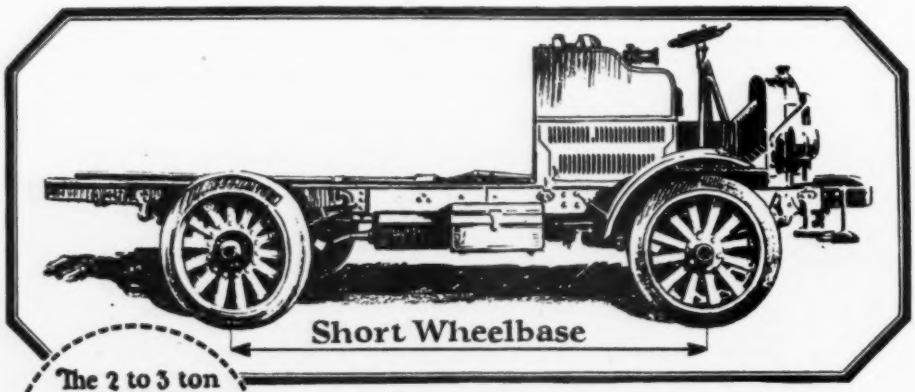
A METHOD of providing additional roadway space for vehicular traffic in the congested sections of cities, to which adequate consideration has not yet been given, is through the installation of sidewalk arcades. On some of the northerly and southerly arterial streets in the borough of Manhattan, it would be practicable, with sidewalk arcades, to substitute eight in place of four moving lanes of vehicular traffic or, in other words, to double the present street capacity and thus to secure much-needed traffic relief at a cost far below that which would obtain through any other method.



FOREIGN EXAMPLES OF ARCADED SIDEWALKS

1. Rue de Rivoli, opposite The Tuileries, Paris. 2. Arcade through the Louvre Department Store on Rue de Rivoli at Palais Royale; provision has also been made here for a sidewalk exterior to the arcade. 3. Rue des Pyramides, Paris, looking from Place de Rivoli; the Place and the street have been arcaded on both sides. 4. Junction of Arlington Street with Piccadilly, London, showing arcade through Ritz Hotel. 5. "The Rows," Bridge Street, Duke of Westminster's Building, Chester, England; continuous arcade through the second floor. 6. "The Rows," East Gate Street, Chester; second-floor arcade

Autocar Short Wheelbase---a money saving distinctive feature



The 2 to 3 ton 4 cylinder **Autocar** (wheelbase 114 inches) turning circle is only 38 feet in diameter

Autocars, shorter in overall length and turning radius, quickly thread their way through congested traffic and easily get in and out of the cramped places that are encountered time and again in every day's work.

The time saved reduces cost of operation by lengthening the work day of your truck.

For short haul and frequent stop work, it will pay you to investigate Autocar Electric Trucks—with Autocars you can standardize on one make of truck, gas or electric for every kind of municipal work.

Send with your Letterhead

THE AUTOCAR COMPANY
Box 2004, Ardmore, Pa.

Without obligation, please send me
☐ Autocar gas truck book.
☐ Autocar electric truck book.

The Autocar Company
ESTABLISHED 1897
Ardmore, Pa.
Branches in 46 Cities

Autocar
gas *and* electric trucks
EITHER OR BOTH - AS YOUR WORK REQUIRES

While objection has been raised to the use of arcades on the ground that they would deprive the lower floors of buildings of natural light, this objection can not be considered a serious one in the sections where arcades would be needed, as these areas are almost invariably developed in such a way as to depend wholly upon artificial light. The opinion has also been expressed by several business men and property owners that the introduction of arcades would depreciate the value of business properties, as the opportunity for show window display would be materially diminished.

Last summer the writer took advantage of the vacation period to make a somewhat hasty inspection of a few European cities, in connection with which he endeavored to study the effect of arcades in the places he visited, with a view to disproving, or otherwise, these objections.

Probably Rue de Rivoli, in Paris, provides the most conspicuous and best-known example of arcades. This street and its extension, Rue St. Antoine, has a total length of about 2¼ miles, extending from Place de la Bastille to Place de la Concorde. Between the latter terminal and Rue de Louvre, or through the westerly third of this distance, it is flanked on the north by business buildings and on the south in part by the Tuileries and in part by the Louvre Palace. Here the street is arcaded on the northerly side, with a total sidewalk width of about 17 feet, of which about 2 feet is occupied by columns setting back about 3 feet from the curb. The roadway is here about 50 feet wide, and the width of the walks on the southerly side is about 15 feet. It will be noted that this is equivalent to a total street width of a little over 80 feet. In the section to the east the roadway width shrinks to about 37 feet, the sidewalk width and width between building lines remaining the same as where it is arcaded. In the arcaded section are located the Louvre Department Store, two large and well-known hotels, and a long line of high-grade shops doing an excellent business. This portion of the street is undoubtedly one of the best-known in the city. To the east, in the unarcaded section, the shops are of an inferior character and are regarded as very much less attractive.

Rue Castiglione and Rue des Pyramides, both terminating at Rue de Rivoli on the south, afford the remaining noteworthy Paris examples of arcades. The former street, for a distance of two blocks, has a roadway width of a little over 60 feet, with sidewalks about 17 feet wide, the width of columns and position of curb being quite similar to those on Rue de Rivoli. In the next block, between Rue St. Honore and Place Vendome, the street is not arcaded and the roadway width diminishes to a little over 40 feet. The street, with its continuation, Rue de la Paix, constitutes one of the most important approaches to Place de L'Opera and is one of the recognized business streets of the city.

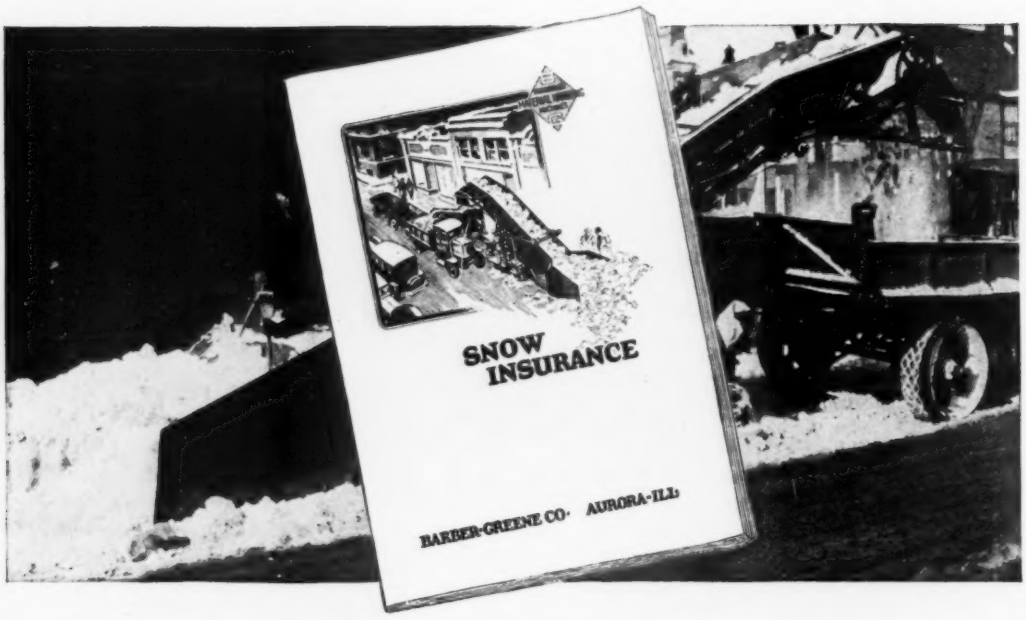
Rue des Pyramides, in the block between Place de Rivoli, located at its junction with Rue de Rivoli and Rue St. Honore, has been arcaded on both sides in a manner similar to Rue Castiglione, except that the walks are one or two feet narrower and the roadway is only 30 feet wide. Through its remaining length of one block, the combined width of roadway and sidewalk is only about 34 feet. This street, in the arcaded section, is likewise regarded as attractive to business. In the case of the Louvre Department Store on Rue de Rivoli at Place Royale, provision has also been made on the Place frontage for an exterior sidewalk adjoining the one under the arcade.

From the studies made, although too limited to permit of looking into actual property values, the writer is of the opinion that the Paris examples of arcades fully justify the belief that they are not harmful to business, but rather the contrary.

In London two arcaded sidewalks were observed, both on Piccadilly. One of these passes through the Ritz Hotel and the other through the London County Fire Office, but neither of these examples was coupled with the provision of an increase in roadway width and they seem to constitute an actual encroachment upon the sidewalk area. They are noted as illustrative of the absence of prejudice to their use from a business standpoint.

In the latter connection the arcades of Chester are of particular interest. These extend for a distance of a block in each direction from the common intersection of the two main streets within the city walls. In each case they are located in the second story and are flanked by another walk adjoining the roadway and at roadway grade, thus providing two business levels. In the better section of these streets there are very attractive stores within the arcades which compare more than favorably with those on the lower unarcaded level or with those in much larger communities, and at least here afford a practical demonstration of the attractive features of an arcade as compared with ordinary frontage.

The accompanying views show some of the



How Cities are "Licking" Snow this Winter

The Barber-Greene Company, in connection with its snow-loader, has come into contact with the snow problems of a number of cities. Naturally such contacts have led to the collection of considerable material on snow costs and how they can be best defeated.

The heavy rapid traffic of the modern city is too easily thrown into tangled snarls by a winter snow storm. Traffic congestion continues as long as the snow is allowed to remain on the streets.

Such conditions are reflected in decreased business, slow transportation, delayed deliveries and a thousand and one minor inconveniences. In addition snow can seriously impede fire equipment, greatly increasing fire dangers.

If enough hand labor is secured to clear the streets with the rapidity that assures a prompt return to normal it will usually show exorbitant costs. Many cities are turning to efficient Barber-Greene snow-handling to relieve themselves of such costs.

The Barber-Greene Company has assembled the more intertesing of its information on snow problems and their solutions into a twenty-five page illustrated booklet, *Snow Insurance*. This book shows snow handling methods that are employed in different sections of the country. As such information is so obviously of value to those interested in snow and snow removal, a copy of *Snow Insurance* will be mailed to anyone requesting it.

BARBER-GREENE COMPANY—*Representatives in Fifty Cities*—515 W. Park Avenue, Aurora, Illinois

BARBER GREENE

Portable Belt Conveyors — Self Feeding Bucket Loaders

Coal Loaders . Automatic Ditch Diggers — Snow Loaders . . . . Coal Feeders

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arcades referred to. Nearly all of the Paris pictures were purposely taken on holidays when there was little business, and all of them were taken at favorable opportunities for avoiding moving traffic as much as possible.

The modern type of steel frame office and loft building lends itself readily to arcade introduction, with little structural change, and with no other method does it seem possible to bring about an increase in street width with as little encroachment upon the taxable values of the abutting property.

Salaries of Chiefs of Police and Fire Departments

FROM the results of a survey of the salaries paid by police and fire departments in all cities in the United States having a population of 100,000 or over, made during the year 1924 by the Bureau of Labor Statistics, the accompanying tables showing the salaries of the active heads of these two departments in specified cities have been compiled.

In the police department table the salary given in each case is that of the Superintendent or Chief of the department, with the exception of the following cases where the active head or heads of the department serve under other titles: Baltimore's figures are those of the Commissioner and the Chief Inspector, respectively. Boston's figures are for the Commissioner and the Superintendent, respectively. New York's figure is that of the Commissioner.

The figures given in the fire department tables are for the Chief of the department in each case.

In a number of cities increases in salaries have been made since the figures shown in these tables were reported, but it has been thought best to show the data as of a uniform date. The salaries given are those that were in effect in April, 1924:

	Police	Fire
Akron, Ohio	$4,050	$4,050
Albany, N. Y.	3,500	3,500
Atlanta, Ga.	4,000	4,000
Baltimore, Md.	10,000	4,500
Baltimore, Md.	4,000	....
Birmingham, Ala.	4,800	3,600
Boston, Mass.	8,000	5,500
Boston, Mass.	7,000	....
Bridgeport, Conn.	5,000	5,000
Buffalo, N. Y.	5,000	5,500
Cambridge, Mass.	3,750	3,750
Camden, N. J.	3,000	3,000
Chicago, Ill.	10,000	8,000
Cincinnati, Ohio	6,000	6,000
Cleveland, Ohio	5,500	5,500
Columbus, Ohio	3,470	3,470
Dallas, Tex.	3,600	3,600
Dayton, Ohio	3,000	3,000
Denver, Colo.	3,600	4,200
Des Moines, Iowa	3,220	3,720
Detroit, Mich.	6,000	6,000
Fall River, Mass.	4,000	3,850
Fort Worth, Tex.	2,500	2,400
Grand Rapids, Mich.	3,700	3,700
Hartford, Conn.	4,950	4,950
Houston, Tex.	4,000	3,600
Indianapolis, Ind.	4,000	4,000
Jersey City, N. J.	5,500	5,500
Kansas City, Kans.	2,700	3,000
Kansas City, Mo.	5,000	4,700
Los Angeles, Calif.	6,000	6,000
Louisville, Ky.	4,000	4,000
Lowell, Mass.	3,500	3,500
Memphis, Tenn.	4,800	4,800
Milwaukee, Wis.	5,500	5,500
Minneapolis, Minn.	5,000	5,000
Nashville, Tenn.	4,000	4,000
Newark, N. J.	5,400	5,400
New Bedford, Mass.	3,500	3,500
New Haven, Conn.	4,500	4,500
New Orleans, La.	5,000	5,000
New York, N. Y.	10,000	10,000
Norfolk, Va.	3,600	3,600
Oakland, Calif.	3,960	3,960
Omaha, Nebr.	4,000	4,500
Paterson, N. J.	3,800	3,800
Philadelphia, Pa.	5,000	5,000
Pittsburgh, Pa.	5,000	5,000
Portland, Ore.	3,900	3,900
Providence, R. I.	4,160	3,640
Reading, Pa.	2,400	*2,100
Richmond, Va.	4,000	3,500
Rochester, N. Y.	4,500	4,500
St. Louis, Mo.	5,000	5,000
St. Paul, Minn.	4,000	4,000
Salt Lake City, Utah	3,600	3,600
San Antonio, Tex.	3,000	3,000
San Francisco, Calif.	6,000	5,360
Scranton, Pa.	2,800	2,800
Seattle, Wash.	4,800	4,800
Spokane, Wash.	3,104	3,105
Springfield, Mass.	4,400	4,400
Syracuse, N. Y.	4,800	4,000
Toledo, Ohio	3,500	3,500
Trenton, N. J.	4,000	4,000
Washington, D. C.	4,500	4,000
Wilmington, Del.	3,600	3,000
Worcester, Mass.	4,250	4,250
Yonkers, N. Y.	4,800	4,500
Youngstown, Ohio	3,600	3,300

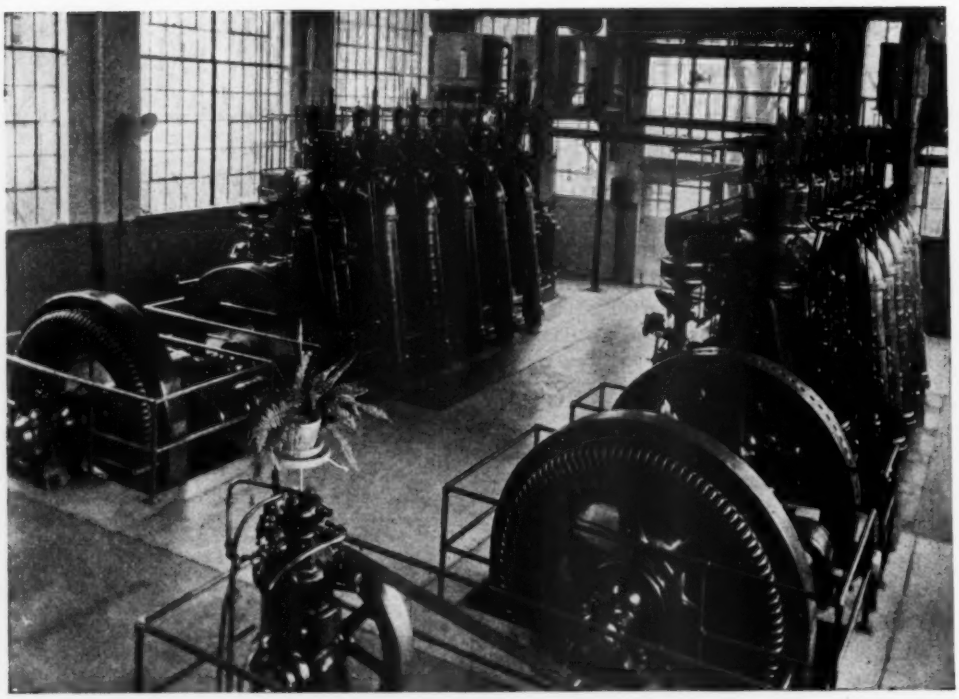
*Volunteer department.

A Newspaper's Comments on Graft in City Government and the Value of a Bureau of Research

COMMENTS on the death of George Washington Plunkitt, long a henchman of Tammany Hall, recall a stage in the history of American municipal government which, though it ended only a few years ago, seems fantastic. Fernando Wood once said to him, "Never take anything from anybody," and he remembered the remark, and made it one of the watchwords of his life—but he grew rich as a New York city contractor. "Nobody thinks of drawing a distinction between honest graft and dishonest graft," he is quoted as having said during one of New York's municipal scandals. "There's an honest graft, and I'm an example of how it works. I might sum up the whole thing by saying: 'I seen my opportunities and I took 'em.'" Blackmail and paying the police for protection were dishonest graft. City contracts were different.

There was a time when such incidents as the paying of city money for cinders that had not been delivered would have opened every city department to suspicion.* There would have been a tremendous hue and cry. As it is, the citizenry of Detroit are taking the matter very coolly. They do not believe the municipal government corrupt, because they know more about their city affairs to-day than could possibly have been learned a generation ago. City government is no longer the

[*The reference is to an investigation of alleged irregularities in the Department of Public Works, of Detroit, in the awarding of contracts for trucking, hauling and sidewalk construction.]



Two 550 B.H.P. Nordberg Diesel Engines Installed in the Municipal Plant at Neodesha, Kan.

A 73 Percent Reduction in Kilowatt Hour Costs

The municipal power plant at Neodesha, Kansas, equipped with Nordberg Diesel engines, not only furnishes dependable service at low rates but also proves a profitable investment for the city. Even though the load carried is but 20 per cent of the installed capacity, marked savings are being made in comparison with the old steam plant as shown in the table below. These figures are for 10 months' operation.

Plant	Costs				Total Cost	Output in Kw Hr.	Cost per Kw. Hr.
	Fuel	Labor	Lubr	Supplies Maintenance			
Steam 1922	$22,368 82	$9,335.56	$441.70	$655.31	$32,801.39	709,190	$0.0469
Diesel 1923	$3,651.21	$10,027.53	$405.26	$93.12	$14,177.02	1,132,000	$0.0126

Percentage saving in operating costs with Diesel plant—56.8
Percentage saving in K.W. hour costs with Diesel plant—73.1

Get the complete story of this plant by writing for pamphlet entitled, "Profitable Power for the Municipal Plant." Also write us for Bulletin NY-3.

Nordberg Manufacturing Company

Milwaukee

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secret, slack, unguarded mess that it was in the halcyon days of the bosses. It is, as a rule, efficient, and it will remain so just as long as the people continue vigilant with their Research Bureau and other evidences of watchfulness. And this will be so even if there are uncovered some real deficiencies in cinders, sidewalks and paving.

Mr. Plunkitt lived long enough to become a comic character. People heard him talk, and smiled. A good deal of what he told them they did not believe. A new generation could not imagine such conditions as having been true. And that speaks well for the success of the American people in dealing with a problem which not so many years ago seemed hopeless—the problem of clean city government.

—An editorial from the *Detroit News* of November 30, 1924.

Progress in Bill-Board Elimination

A BRIEF report of the first year's progress of the National Committee for Restriction of Outdoor Advertising, which was established in December, 1923, has been issued in leaflet form. This group of men and women, representing state and national organizations interested in the problem of restricting sign-board advertising, urges not the abolition of all display advertising, but its restriction to commercial districts where it will not injure scenic or civic beauty, or residential values. The Committee aims to do two things: first, to draw out an expression of public opinion on this matter; and, second, to carry that expression directly to the advertiser.

During the past year literally thousands of protest letters, received by the National Committee from local committees, clubs and individuals all over the country, have been poured upon the desks of many of the leading national advertisers. The problem has also been presented from the platform in towns and cities in fourteen states. More than fifty organizations, twelve of which are national in scope, are now cooperating in the work. Committees in fourteen states are actively at work on the Protest-by-Letter campaign. Newspapers and magazines all over the country have given the movement favorable publicity.

As many as twenty-one advertisers already have endorsed the stand taken by the National Committee and have agreed to confine their advertising, so far as possible, to commercial districts, due allowance to be made for present contracts not yet expired. Many other advertisers have expressed their general agreement with the principle of restriction.

Expressions of opinion from organizations and individuals interested in promoting this movement will be welcomed by the Chairman of the National Committee, Mrs. W. L. Lawton, 5 Chester Street, Glens Falls, N. Y.

Recent Court Decisions Pertaining to Public Health

(*From the U. S. Public Health Reports, October* 17, 1924)

Use as cemetery of land near water-supply restrained.—The New York Supreme Court has restrained the use of certain land for cemetery purposes and has held that a town board of health was justified in adopting a resolution declaring the proposed use of the land for such purposes to be a public nuisance. The land in question was near several drinking-water wells, and, because of the nature of the soil, the burial of dead human bodies on the tract would have created a nuisance. (Town of Cheektowaga *v.* Sts. Peter and Paul Greek Russian Orthodox Church, of Buffalo, N. Y., 205 Supp. 334.)

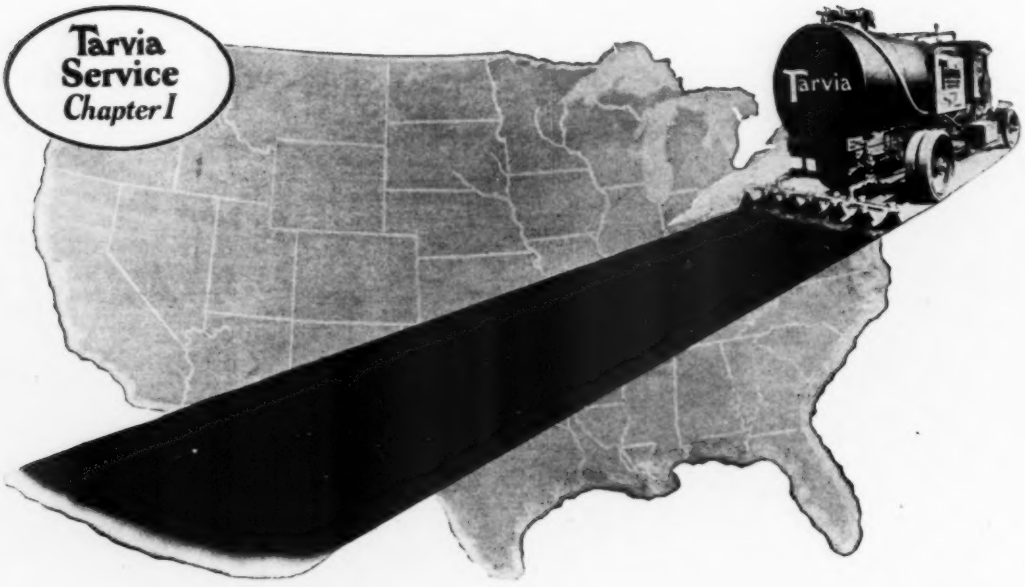
City liable for negligent installation and management of incinerator.—The Supreme Court of South Carolina has decided that a city must respond in damages for the negligent installation and management of an incinerator. The Court held that the action was maintainable against the city, even though there was no statute authorizing it, and also held that the plaintiff had a cause of action based upon negligent operation, even though he may not have suffered damage different in kind as well as in degree from what the general public has suffered. (Kneece *v.* City of Columbia, 123 S. E. 100.)

City liable for sewage pollution of stream.—Even though a city has created and maintains a recognized sewage disposal plant or was not negligent in its adoption of a proper plant, the Supreme Court of Wisconsin has held that it must respond in damages where it has created a nuisance by the discharge of sewage into a stream, and that it is subject to injunctive relief having as its aim the abatement of the nuisance. (Mitchell Realty Co. et al. *v.* City of West Allis, 199 N. W. 390.)

Discharge of sewage effluent by city.—The California District Court of Appeal, Third District, has held that a permit issued by the State Board of Health, authorizing a city to discharge sewage effluent into a river does not authorize the city to create or continue a nuisance or in any wise limit the power of the Court to abate the same if found to exist. (People *v.* City of Reedley et al. 220 Pac. 408.)

Physical examination of venereally infected person.—The Supreme Court of Mississippi, Division B, has held that a statute which authorized the physical examination of any person suspected of being afflicted with an infectious venereal disease was not violated by a refusal to appear for examination in response to a summons issued by an officer of the board of health. The constitutionality of the act in question (chapter 194 of the 1918 session laws) was attacked, but was not passed upon by the Court. (City of Jackson *v.* Mitchell, 100 South, 513.)

The state-wide milk sanitation program of the Alabama State Board of Health is given in Public Health Reports for November 7, 1924, issued by the U. S. Public Health Service, Washington, D. C. This pamphlet contains the standard milk ordinance for Alabama municipalities.



The "Why" of Tarvia Service—

FOR many years these two things have caused much favorable comment: (1) The dependable precision of Tarvia delivery service; (2) The unvarying quality of Tarvia. Explanation is simple:

Barrett plants strategically located throughout the country insure "on-the-dot" delivery and production in quantities to meet any demand.

In every plant uniformly high quality of the product is assured by strict laboratory control. Plant laboratories are checked by the central Research Department of The Barrett Company. In every plant shipments are made on a carefully checked schedule—whether in tank-cars, tank-trucks, tank-wagons, barges or barrels. In brief—

You get Tarvia where you want it, how you want it—and when you want it.

The Barrett Company

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Minneapolis	Salt Lake City	Bethlehem	Lebanon
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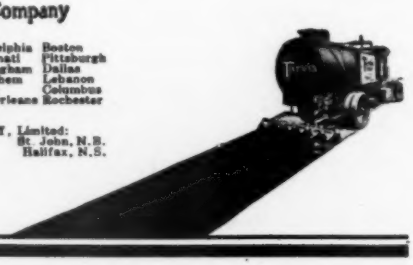
Tarvia
For Road Construction Repair and Maintenance



Relation of Improvements in Water-Supplies to Intestinal Diseases

By C. A. Holmquist

Director, Division of Sanitation, New York State Department of Health

IN 1900 the average typhoid fever death-rate in the registration area then existing in the United States was 31.3 per 100,000 population. During the five-year period from 1918 to 1922, inclusive, the rate in this same area was only 5.3, a reduction of 83 per cent. Practically the same conditions have been experienced in New York State. In 1900 the typhoid fever death-rate in New York State was 26.7, and during the five-year period ending 1923 it was only 3.3, a reduction of 87.6 per cent. This is very significant when we consider that in a population of 10,000,000, a drop in the typhoid rate of 1 per 100,000 means a saving of over 100 lives per year.

That typhoid fever and certain other intestinal diseases are often water-borne is too well known to need discussion. A large number of typhoid outbreaks have resulted recently from cross-connections between polluted auxiliary fire and industrial supplies and domestic municipal supplies, and from temporary failures or interruptions in the operation of water purification and treatment plants handling raw waters polluted with sewage. It may be worth while, however, to call attention to the remarkable reduction that has taken place in the typhoid fever death-rate in this country, and particularly in the state of New York, during the past twenty years. I shall endeavor to show that this reduction has been coincident with and largely the result of developments, extensions and improvements in public water-supplies.

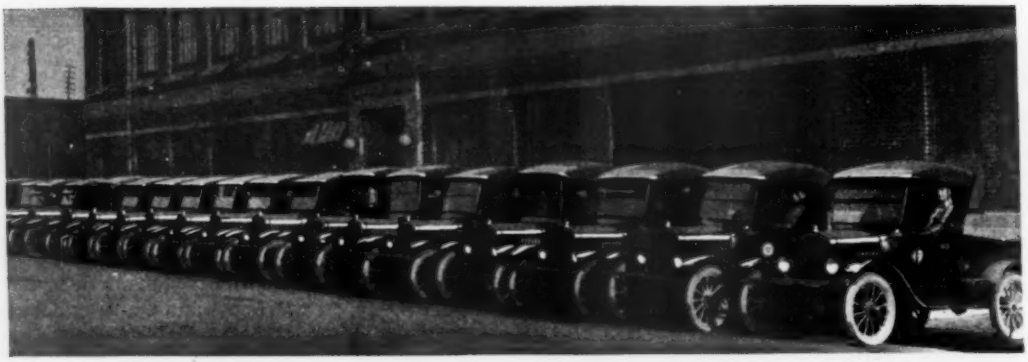
Let us now see what has happened in the water-supply and water-works fields in the meantime. In the first place, the number of persons supplied with purified or treated water has increased enormously during the past twenty years. This has been due in a large measure to the development of the application of chlorine to public water-supplies. Whether we consider chlorination as a method of purification in itself or simply as an auxiliary safeguard or finishing process, is, in my opinion, of minor consideration. The important fact is that millions of people are now supplied with chlorinated and relatively safe water who would otherwise be drinking raw water or improperly purified water of questionable sanitary quality. Secondly, the art of water purification has advanced, notably in the development and perfection of mechanical filtration. These two factors have been instrumental in raising the standard of purity of water. Last but not least, health authorities, water-works officials and the general public have learned that polluted drinking water means a high typhoid fever death-rate, and most of the states in the Union have passed water-supply, sewerage and anti-pollution laws.

In 1906 only about 700,000 persons, or less than 10 per cent of the population of New York State, were served with purified water. Now, nearly 8,000,000 persons, equal to about 73 per cent of the entire population of New York State, are using purified or treated water. This represents an increase in the number of persons served with treated or purified public water-supplies, of over 1,000 per cent since 1906. In 1906 there were only some 18 filter plants, mostly of the pressure mechanical type, in operation. It will be seen from the table below that in 1922 there were 176 water purification and treatment plants serving 261 municipalities in New York. Nearly 70 per cent of the surface water-supplies serving about 80 per cent of the municipalities in the state, are treated. Furthermore, during the same period the number of persons served with public water-supplies in New York has increased from about 6,000,000 to 9,182,000, equal to an increase of 53 per cent, whereas the population in the state has increased only about 27 per cent in that time, or from 8,405,000 to 10,651,000:

SUMMARY OF WATER-SUPPLY DATA OF NEW YORK STATE, 1922

1. CLASSIFICATION AS TO SOURCE

Character of Source of Water-Supplies	No. of Supplies	No. of Communities Served	Population Served
Surface water (a)	249	330	7,823,000
Ground water	215	270	1,066,000
Supplies derived partly from surface and partly from ground-water sources (b)	89	91	293,000
Total (c)	553	691	9,182,000



Dayton Power and Light Uses 46 Fords and 2 Fordsons

Public Service and Municipal Departments will profit by reading this complete report of Ford Car, Ford Truck and Fordson Tractor performance from O. B. Reemelin, General Superintendent of the Dayton Light & Power Company, Dayton, Ohio:

"*Two Fordsons save* $81 *per day for us.* One Fordson and a 5 ton truck are used for hauling coal from cars to the power plant. The Fordson hauls a trailer carrying 3½ tons per load and makes the one mile round trip every 20 minutes. Because the Fordson gets to the unloading platforms quicker and dumps faster, it hauls just as much coal in a day as the 5 ton truck. The Fordson saves over $6 per ten hour day on coal hauling as compared with the big truck. Its initial cost is 1/5 as much as the 5 ton truck and it operates for less than half as much.

"*The second Fordson drags poles, saws wood, and is a general utility power unit.* We formerly did all wood sawing by hand. The Fordson now saves $75 a day on this work since with 5 men it saws as much wood in a day as 21 men could saw by hand.

"*Eighteen Ford Roadsters and* 16 *Ford Light Delivery Cars* are used for meter testing, setting and inspecting; for line inspecting and trouble shooting; for time keeping; and for various other work. Six Ford Touring Cars are used for survey and right of way work. Five Ford Ton Trucks are used for light line work, tree trimming, and general utility work. One Ford Coupe is used for inspecting.

"*Our Model T Fords* operate (excluding driver's wage) for less than 5 cents a mile. Our records cover the operating cost of all of our motor equipment. We know just which equipment it pays us to buy and operate. Our results with Ford equipment are highly satisfactory."

Your nearest Authorized Ford dealer can furnish many interesting figures on the cost of operating Ford Products in your business. Call on him for this information and a practical demonstration.

Ford One-Ton Truck Chassis, $365 f. o. b. Detroit

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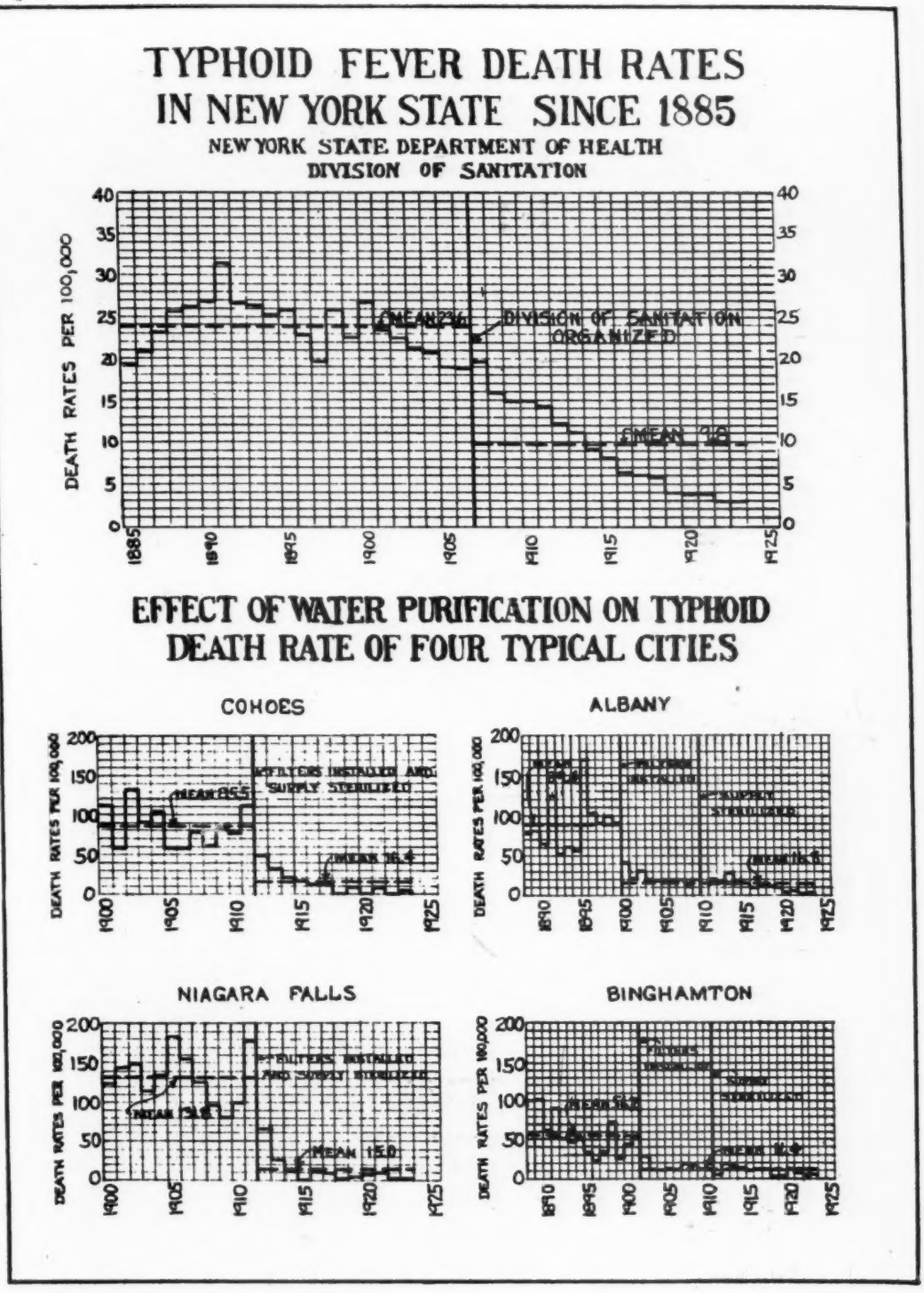
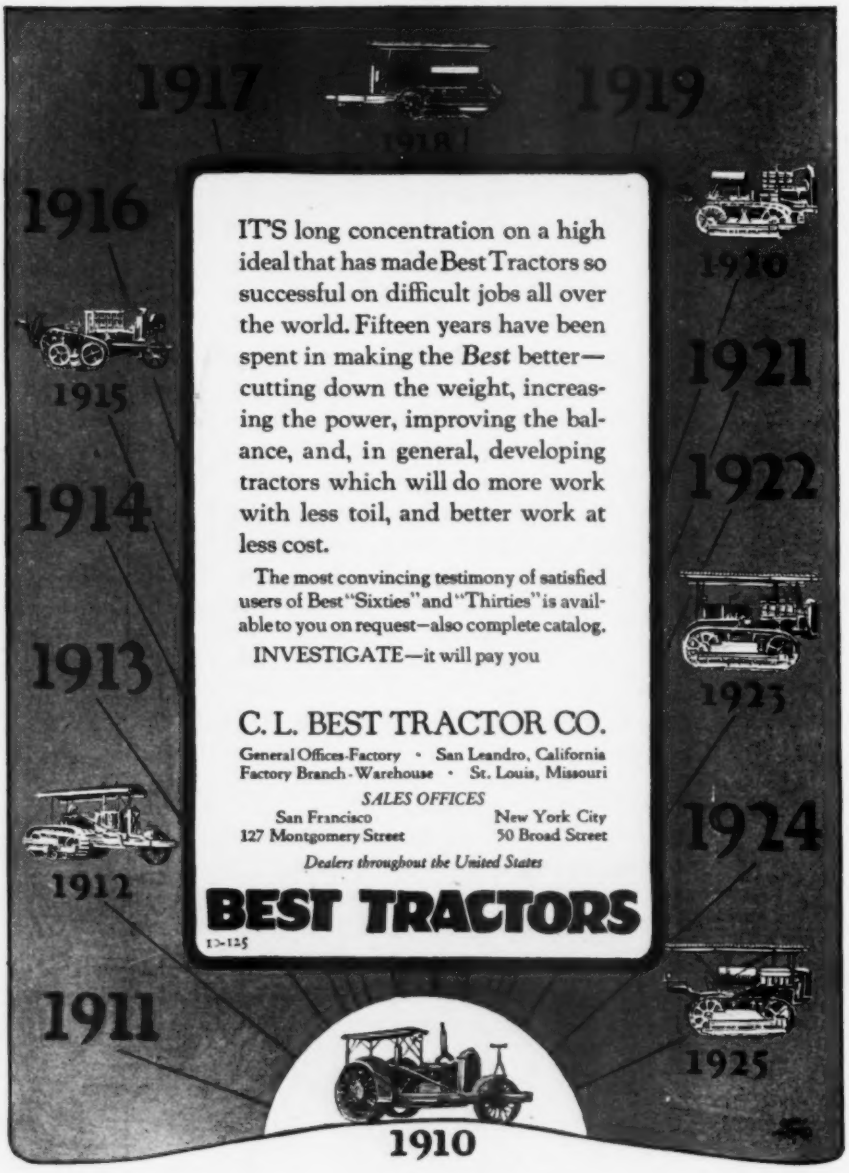


The results of improvements in public water-supplies have been clearly reflected in the typhoid fever death-rate. The average rate for the 22-year period from 1885 to 1906 was 23.6. Since 1906, there has been a gradual and fairly uniform drop in the typhoid rate until 1923, when it was only 2.9 per 100,000 population. That this remarkable progress

15 YEARS
of Making BESTS Better



IT'S long concentration on a high ideal that has made Best Tractors so successful on difficult jobs all over the world. Fifteen years have been spent in making the *Best* better—cutting down the weight, increasing the power, improving the balance, and, in general, developing tractors which will do more work with less toil, and better work at less cost.

The most convincing testimony of satisfied users of Best "Sixties" and "Thirties" is available to you on request—also complete catalog.

INVESTIGATE—it will pay you

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BEST TRACTORS

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2. CLASSIFICATION AS TO TREATMENT

Character of Treatment of Water-Supplies	No. of Supplies	No. of Communities Served	Population Served
Treatment by chlorination only (d)	79	123	6,726,000
Mechanical filtration and chlorination	48	83	657,000
Slow sand filtration and chlorination	12	15	325,000
Mechanical filtration without chlorination (e)	20	22	44,900
Slow sand filtration without chlorination (f)	17	18	43,300
Total (g)	176	261	7,796,200

(a) Of the 249 surface water-supplies in the state, 98 are protected from contamination by rules and regulations enacted by the State Department of Health.

(b) Although the New York City supply is derived partly from wells, it is listed under surface supplies, inasmuch as only a very small percentage of the total supply is from wells.

(c) Of the 553 supplies in the state, 336 are owned and operated by municipalities; 192 are owned and operated by water companies serving one community each, and 25 are owned and operated by water companies serving two or more communities each.

(d) Includes both liquid chlorine and hypochlorite plants.

(e) Of the 68 mechanical or rapid sand filters, 34 are of the gravity type and 34 of the pressure type, and one supply has both a gravity and a mechanical filtration plant.

(f) A few water-supplies are provided with both slow sand and mechanical filters operated either in series or independently. In such cases they are counted under the type of filter predominating.

(g) Eighty-six per cent of population in state served by public water-supplies, 73 per cent by treated water.

NOTE.—The estimated population of the state in 1922, based upon the average annual increase between the United States censuses of 1910 and 1920, was about 10,651,000.

has been due in a large measure to improvements in public water-supplies is shown by the result of the installation of filtration and chlorination plants in such cities as Niagara Falls, Albany, Binghamton and Cohoes. In each case there was a decided and pronounced drop in the typhoid rate immediately after the installation of water purification plants, and the more grossly polluted the source of water-supply, the more pronounced was the drop.

Result of Improved Supply in Niagara Falls

The water-supply of Niagara Falls, which is a city with a population of about 60,000, is derived from the Niagara River about 25 miles below the city of Buffalo and about 10 miles below the cities of Tonawanda and North Tonawanda. The sewage from these cities, having a combined population of over 500,000, is discharged without treatment into the river. Until 1912 the grossly polluted river water was used partly raw and partly inefficiently treated and it is not surprising that Niagara Falls had the highest typhoid fever death-rate of any city in the state. In 1911 two water purification works, each consisting of gravity mechanical filters and chlorination plants, were installed, one by the city and the other by the Western New York Water Company. Before these works were installed and put in operation, the typhoid fever death-rate in that city ranged from 80 to 184, with an average rate of 131.8. The first year that the purification works were in operation the rate dropped from 179.1 to 65.2, and the next year to 26.6. During the past six years the rate has been only 5.0, a reduction of about 96 per cent. This remarkable reduction must be attributed very largely to the purification of the water-supply; in fact, it could hardly be accounted for in any other way. Incidentally, it might be noted that these works have been a paying investment to the city, not only from a public health but from an economic standpoint. A death-rate of 131.8 in Niagara Falls means 79 deaths a year from typhoid and probably 10 times as many cases. Assuming that a life is worth $5,000, there would have been an economic loss of some $400,000 a year if that rate had continued.

Cohoes Benefits by Better Water

The city of Cohoes, of about 23,000 population, obtains its water-supply from the Mohawk River some 18 miles below the city of Schenectady. The sewage of Schenectady, which has a population of about 90,000, was discharged into the Mohawk River without treatment until 1915. It also receives the raw sewage from the cities of Amsterdam and Utica and part of Rome, and from a number of smaller municipalities. In 1911 the city of Cohoes installed gravity mechanical filters and a chlorination plant. The typhoid fever death-rate of Cohoes prior to the installation of these works varied from a minimum of 57.8 to a maximum of 133.2, with an average of 85.5. The average rate for the past six years has been 3.7 per 100,000 population.

Improvement in Albany

The city of Albany, which has a population of nearly 120,000, derives its water-supply from the Hudson River at a point about 8 miles below the mouth of the Mohawk River and from 4 to 10 miles below the cities of Troy, Cohoes and Watervliet. These cities, which have a combined population of over 100,000, discharge their sewage into the Hudson River without any treatment; in fact, the sewage from a population of nearly 500,000 is discharged into the Hudson and Mohawk Rivers and their tributaries above the Albany intake. In 1899 slow sand filters were installed, and in 1908 preliminary or scrubbing filters of

Everything "Good Roads" Equipment

saves time and money in the construction and maintenance of roads and streets

Big Winner Grader pulled by a Best "30" Tractor

Monarch 10 ton Steam Roller at work in Sumter Co., Ga.

This year—1925—marks the 48th year that we have been in the business of selling Road Building Equipment. Since we offered the Pennock Road Scraper in 1877, machinery has grown to be more and more of a factor in road construction, until today the question of equipment is the most important one that confronts the road builder.

Good Roads Equipment can always be depended upon to be the most modern in design and the most economical in operation. Our line includes Graders, Rollers, Car Unloaders, Gravel Screening Plants, Heating Kettles, Oiling Machines, Culvert Pipe, Rock Crushers, and all attachments for same. In addition, we supply free of charge, expert engineering advice and unequalled service. Experienced contractors know the Good Roads line and standardize on it.

If you visit the Chicago Road Show, look us up at booth N.C. 34 in the New Coliseum. Our exhibit will interest you. Let us get acquainted.

Every road builder should have our latest catalogue of road building machinery. Write today for *your* copy.

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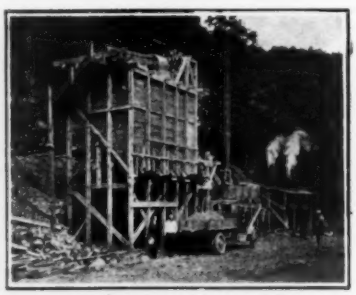
24 Pleasant St. Watertown, Mass
569 Whitehall St., Atlanta, Ga.
Commercial Trust Bldg., Philadelphia, Pa.
1523 Oliver Bldg., Pittsburgh, Pa.
49th & Halsted Sts., Chicago, Ill.

Champion Distributor applying material in Iron Co., Mich.

Monarch Cub Roller Scarifying a hard road.



No. 6—12x26—Champion Crushing Plant.

for the Road Maker

the gravity mechanical type were completed and put in operation. In 1909 chlorination of the supply with hypochlorite of lime was commenced, and in 1916 this treatment was supplanted with treatment by liquid chlorine. Before the slow sand filters were installed, the typhoid fever death-rate of Albany varied from 52.8 to about 171.4, with an average of 89.4 per 100,000 per year. The first year after the installation of slow sand filters the typhoid fever death-rate of Albany was reduced from 87 to 40. During the past five years the average death-rate from typhoid has been 4.1. The rise in the rate noted in 1913 was due to the flooding of the clear-water well of the filtration plant owing to high water in the Hudson River. For two days raw Hudson River water was pumped into the system, causing 180 cases of typhoid and 20 deaths.

Binghamton Benefits Also

The city of Binghamton, with a population of about 75,000, derives its water-supply from the Susquehanna River above its junction with the Chenango River. Although this stream receives comparatively little raw sewage within 75 miles of the intake, the river has a drainage area of some 2,400 square miles and flows through a fairly thickly developed rural district. Gravity mechanical filters were installed in 1901, and chlorination of the supply was commenced in 1910. The typhoid fever death-rate at Binghamton before the filtration plant was installed varied from about 25.5 to 101, with an average rate of 56.2 per 100,000 population, and since 1918 has been 4.0.

Reduced Typhoid Rates Not Due Entirely to Improved Water-Supplies

I do not, however, wish to give the impression that extensions and improvements in public water-supplies have been entirely responsible for this reduction. Other factors, such as milk pasteurization, improvements and extensions of sewerage facilities and the consequent elimination of insanitary privies; campaigns against the fly, and more efficient public health work and public health education, have all been important allies in the fight against typhoid. In fact, in many localities these factors must be depended upon largely in the further reduction of typhoid, especially in states having large negro or foreign population or more primitive health organizations. In such places we often find municipalities which have very good water-supplies but high typhoid rates.

In New York and certain other states having low typhoid rates and generally satisfactory water-supplies, it will not be possible to materially reduce these present rates through improvements in water-supplies and the installation of water purification plants. Owing, however, to the fact that many of the purified supplies are derived from more or less grossly polluted sources, it will be necessary not only for health authorities but also for water-works officials and operators to make every effort to see that the purification plants treating such waters are at all times operated with the greatest care and efficiency if we are to avoid outbreaks of intestinal diseases.

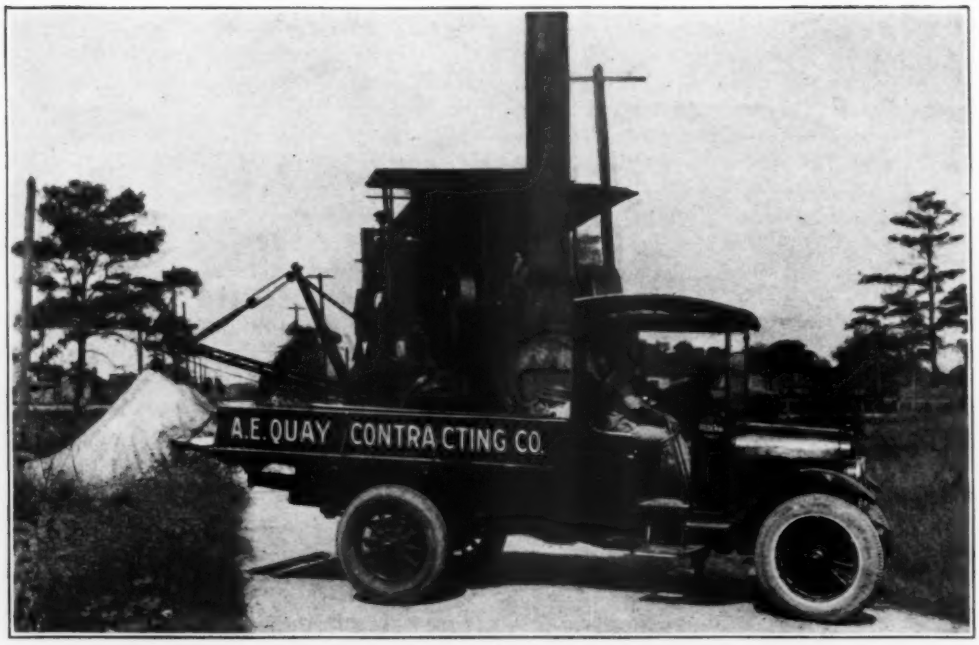
ACKNOWLEDGMENT.—From a paper read before the New England Water Works Association, at Rochester, N. Y.

Names for Real Estate Subdivisions

THE problem of selecting suitable names for subdivisions or new districts is one that has to be faced by practically all real estate subdividers. While the list of names from which selections may be made is almost unlimited, and various practical methods of making a choice may be adopted, it is frequently difficult to find a name that will harmonize with the characteristics of the particular tract under development. That this difficulty has not always been met successfully is evident from a survey of the names borne by some subdivisions in this country at the present time. For instance, "Forest Hills" has in some cases been applied to almost level tracts of land on which one can find only newly planted trees of perhaps two inches in diameter; or "Oak Crest" has been chosen for a large district where the few oaks originally standing lay in the path of building and of necessity had been cut down.

As one method of solving the problem, a subdivider may decide to perpetuate a name of historic interest associated with the district under consideration. Names of men eminent in public life offer many suitable suggestions, or a choice may be made from the almost endless list of picturesque Indian names. In the latter case names having some local connection should be adopted, where possible. Another practical method lies in making a choice from names that may be of historic or racial interest to the class of people predominating in the section to be named. Or, a developer may see fit to take advantage of the excellent oportunity for publicity by applying the name of his company or his own individual name.

Together with an interesting article on this subject, the *National Real Estate Journal*, in its issue of November 17, published a list of about 750 subdivision names suitable for general use. In this list, made up of basic names and combinations that show how names have been built, subdividers will undoubtedly find many good suggestions for naming developments of all classes.



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From the International Union of Cities

Items translated from "Tablettes Documentaires Municipales" by Stephen Child, 638 Merchants Exchange Building, San Francisco, Calif., to whom requests for further information regarding this source of civic documentation should be addressed

The Present Land Policy of Russia. 33.3 (47)

This policy is now regulated provisorily by a law passed the 12th of January, 1922, and by the Civil Code of the 1st of January, 1923. As a result of these laws, it is provided that all land without exception remains the property of the state. Each occupant has an hereditary right to cultivate the land; he pays the state a relatively low land rent tax; and he pays the commune or township a tax based upon the real value of the land. The policy of communalization of the construction of buildings is replaced by a form of exploitation-right. The land is rented for 20 years if it is proposed to erect wooden houses, and for 50 years if it is a question of stone or brick houses. Building laws and regulations have now been thoroughly revised.

Civic Regeneration in Cork, Ireland. 71.31 (41.5)

Plans for the regeneration of Cork have recently been prepared that will serve as an effective guide in the future developments of that city and, it is hoped, raise the general level of public health and well-being, putting a limit upon the erection of unhealthful houses and upon the preservation of such of this sort as exist, encouraging industrial development by better conditions as to means of transportation and better sanitary regulations of the city and its surroundings.

Rumania Looks Ahead About City Planning. 71.31 (498)

At a City Planning Congress recently held in Timisoara under the auspices of the Union of Cities of Rumania, the future of city planning in that country was carefully considered and a program, administrative, financial and technical, was mapped out. There has been some criticism of this program as placing too much stress upon the first two factors. It is believed the technical program should provide (1) for legislation in regard to the planning of cities, (2) for the creation of technical city bureaus directed by specialists with a view to the execution of necessary city work, and (3) the creation of a state bureau, a central office having for its purpose the assembling of necessary data for the study of the entire question of the development of all Rumanian cities and the organization of conferences with a purpose of helping this forward.

A New Garden City Near Brussels, Belgium. 71.313 (493.2)

On an area of about 75 acres in the suburban township of Woluwe-St. Lambert, a cooperative building society has recently built a new garden suburb, known as Kappeleveld. Here they have already erected 420 houses, and several hundred others are to follow. All these houses have been specially designed for intellectual workers. The initiator and author of the general plan is the well-known Belgian city planner, Louis Van der Swaelmen, and the architects of the houses include some of the best-known practitioners in Belgium. There has been a most intimate collaboration and cooperation between these various specialists, resulting in pleasing groups and a most interesting project. There is a considerable variety in the arrangement of roofs, some of which are steeply sloping, while others are flat. This has all been arranged to harmonize with the topography. A comparatively new system of "weak concrete" known as the "Celtic" system has been employed on some of the houses. A well-designed sewer system has been installed, and convenient means of communication with Brussels provided.

The Embellishment of Buenos-Aires, Argentine. 71.6 (82.12)

The City Council of Buenos-Aires has voted a credit of 20,000,000 piastres for the embellishment of the city. It is interesting to note that M. Forestier, the Director of Parks and Gardens of Paris, has been offered the opportunity to prepare plans and has set about this work. He is planning for an avenue 10 metres wide and 5 to 6 miles in length which will be bordered on one side by the river and on the other side by a succession of gardens, parks and villas, together with artificial lakes.

Zurich, Switzerland, Builds Houses. 33.332 (494.34)

Zurich is planning to build within the city itself not less than 1,550 houses, and in eight neighboring districts 270 houses, while further out some 600 more houses are to be built. The houses thus placed on the market will be ready for use this year. This housing activity will not really solve the growing housing shortage.

Regional Planning for Holland. 71.2 (492)

Mr. Bakker-Schut, the Director of Housing and Town Planning at The Hague, has called attention to four urgent cases where regional planning is needed in Holland, as follows: (1) about Amsterdam, including Haarlem, Zaandam and Ymuiden; (2) the region between and including the cities of Rotterdam and The Hague; (3) the district about Utrecht; and (4) the southern part of the mining province of Limbourg, including the towns of Heerten, Kerkrade and others. It is claimed that the question of the extension of cities is influenced by three factors—(a) intercommunal tramways, (b) through highways, and (c) automobile circulation, including auto-busses and trucks, but it is also claimed that these factors may be studied effectively only in a regional plan. Projects for the extension of cities prepared up to the present time bear witness of a lack of coordination with the outlying communities. The elements of a regional plan should also include other means of communication.

City Planning for Tammerfors, Finland. 71.31 (47.1)

This city is built upon ground bordered by two lakes, one to the north and one to the south. It is essentially an industrial city, textile mills being the most important, and its present population is 50,000. Plans are now being made for a considerable extension of the city, with a view to accommodating a population of 120,000. These are the result of a public competition held about two years ago.

Land and Housing Policy of Germany. 33.3+332 (43)

A scheme has recently been proposed in Germany for utilizing what has been called the unmerited increase in values. As a result of the depreciation of German money, debts and mortgages negotiated before the war have for the greater part been amortized or paid off. This has resulted in an unmerited or unearned increase in value to the profit of debtors, which, it is claimed, should be utilized to the profit or the benefit of construction. Two means are now proposed to accomplish this result: (1) all mortgages paid off since the 1st of August, 1914, should be rewritten to the profit of the state, after deducting in each case the amount of the value of paper money converted into gold money; (2) the creation of a general tax on the assessed value of the property, with the effect of recovering as far as possible all the assessment revenue. The scheme as proposed includes many intricate details, but it is believed it should open the way to a more healthy policy in regard to land ownership and housing.

City Planning and Housing in Japan. 71+33.332 (52)

Osaka is the industrial center of Japan and has a population of 1,250,000, which it is claimed is increasing every year at the rate of 3.3 per cent. Plans are being made for controlling developments of this growing city in accordance with laws passed in 1919. The total inadequacy of means of communication is recognized and the scheme includes better arrangements of this sort extending to the outskirts of the community. Seventy-seven different organizations have been formed for the purpose of buying, developing and re-selling large areas of land in small lots; nearly 8,000 acres of such land are being thus developed by these organizations, which are also preparing to build new houses; 15 such organizations have already constructed 1,000 new houses.

The Garden Village of Vreewijk, Southern Holland. 71.312 (492.61)

Vreewijk is a newly built suburb of Rotterdam. There are many straight streets, their length and breadth being varied and often broadening out to include grassed strips and planting spaces with trees and shrubbery. The houses are of a sober design and built in groups, generally with narrow fronts, resulting in a relatively dense population—46 houses to the hectare, or about 18 to the acre. Beauty has been sought in the disposition of these houses and of the planting in front of them. There are many beautiful examples of brick houses.

Housing in Amsterdam, Holland. 61.438.3 (492.62)

An organization has been formed for the construction of new houses for those now badly housed in an old and very poor Jewish quarter, Uilenburg. An inquiry determined the need for better houses for 500 families, which have now been erected at Transvaalbuurt. The picturesque old quarter is to disappear, for living conditions there were frightful. Rents in the new houses vary from 3 to 5 or even 7 florins a week.

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The City's Legal Rights and Duties

Conducted by A. L. H. Street, Attorney at Law

Can a Motorist's Car Be Commandeered by a Police Officer to Pursue a Fugitive?

Mr. Street's Answer to the Letter Published in the Center of This Page

ALTHOUGH a search for court decisions on the precise point fails to yield a direct judicial authority, well-established legal principles adverted to below lead to my conclusion that a motorist is not legally required to comply with a police officer's demand to pursue a fugitive *in the motorist's car.*

Section 1848 of the New York Penal Law, which is to the same effect as laws in many other states, provides that "A person who, after having been lawfully commanded to aid an officer in arresting any person, or in retaking any person who has escaped from legal custody, or in executing any legal process, wilfully neglects or refuses to aid such officer, is guilty of a misdemeanor."

I find no decision at variance with my conception that this law merely requires the summoned person to furnish his *personal aid.* And the authorities cited below appear to confirm an opinion that until and unless express provision is made by legislative act or municipal charter for impressing private vehicles into police service, with reasonable provision for compensating the owner for use of his property, and indemnifying him against damage to the property in such use, there is no right to pursue the police practice here under discussion.

That such commandeering of automobiles falls within the principles of constitutional and eminent domain law is fairly shown by the decision of the Texas Court of Civil Appeals in the case of Galveston vs. Brown, 67 Southwestern Reporter, 156. In that case the city successfully appealed from an award against it on account of horses commandeered by its Police Department when the Galveston flood occurred.

The Mayor had authorized the Police Department to impress into service privately owned horses for use in removing the dead, caring for the sick and wounded, etc. Two of Brown's horses were requisitioned without his knowledge or consent, and he sued for the value of one which was worked to death by the Police Department. The Court of Civil Appeals said:

"All kinds of personal property are subject to the state's power of eminent domain, . . . and this power may be delegated by the state to a municipal corporation. In cases of pressing and immediate necessity—as in the event of an invasion by the public enemy, or some great calamity—this power has been exercised. But when the power is given to a municipal corporation, the taking by it must be authorized by a vote of the governing body, and this must be passed in

City's Liability for Accidents

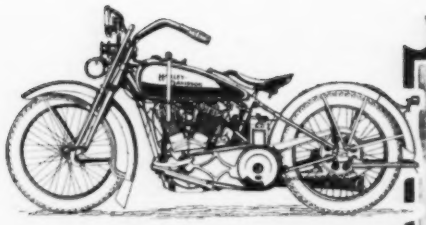
To the Editor of THE AMERICAN CITY:

Your issue of October, 1924, contains an article on page 393 on the subject of "City's Liability for Accidents." This has been read with considerable interest due to a question that has come up recently.

It has always been understood that under the common law it was the duty of every citizen to assist the peace officers when called upon to do so. Recently it has become the habit of a number of traffic officers to commandeer automobiles for the purpose of chasing traffic offenders. In New York one of the magistrates imposed a fine of $10 for the refusal to obey. The writer had two experiences this summer when traffic officers jumped on the running-board of his car and commanded us to overtake another car. In one instance, the car we were chasing left the main highway and went through a sandy road, and for awhile my car, which contained six people at the time, was going at the rate of 55 miles an hour.

I have raised the question as to the responsibility of the municipality under circumstances of this character. If the car owner refuses to obey, he is liable for a fine. If he does obey, does the action of the traffic officer in any way make the municipality responsible? My reason for asking this is that I am informed that some insurance companies are likely to assume the position that insurance on a car designated for passenger service is vitiated when the car is used for police service. Any information you can obtain for me on this subject will be very much appreciated.

WILLIAM KOESTER, Treasurer,
Joseph Dixon Crucible Company,
Jersey City, N. J.



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such manner and by such formalities as are required by law. . . . A municipal corporation is liable for every tortious [wrongful] act of its agents committed by its express command or direct authorization, however unlawful the act may be, provided the act complained of was in or about a subject matter of which it had jurisdiction. . . . We have been cited to no authority conferred upon the city of Galveston by its charter empowering it or its officers to impress or take *under any circumstances* the horses or *personal property of another* into its service or use without the owner's consent. . . . The acts complained of were done by a policeman and patrol-wagon driver under orders and instructions of the Mayor and Chief of Police of the city, neither of whom was authorized by it to make such orders or give such instructions."

From the reasoning of the Texas court it follows that an owner of personal property is not bound to devote it to public use, where no statutory or charter authority for temporarily condemning its use has been made, with appropriate provision for compensation. It likewise seems to follow that if a motorist complies with a traffic officer's command to use his car in pursuing a fugitive, no money demand can be enforced against the city for use of the car or for indemnity against resulting damage to person or property.

And, even if it could be said to be the duty of a motorist to comply with the officer's command to pursue a fugitive, he could not be regarded as being under compunction to drive at any rate of speed that would seriously endanger life or property. He could not excuse driving at a specially dangerous speed on the ground of the officer's command. There is no right to kill a fugitive from arrest for a mere misdemeanor, such as violating traffic regulations. For stronger reasons, there is no right to kill pedestrians or occupants of motor cars as an incident of overtaking such a fugitive.

Where a police officer is using a department vehicle he has no right to drive carelessly. This was recognized not long ago by the Minnesota Supreme Court in the case of Edberg vs. Johnson, 184 Northwestern Reporter, 12. It was there said:

"We do not hold that an officer, when in pursuit of a law breaker, is under no obligation to exercise a reasonable degree of care to avoid injury to others who may be in the public roads and streets. What we do hold is that, when so engaged, he is not to be deemed negligent merely because he fails to observe the requirements of the motor-vehicle act. His conduct is to be examined and tested by another standard. He is required to observe the care which a reasonably prudent man would exercise in the discharge of official duties of a like nature under like circumstances."

If a motorist complies with the officer's command to drive in pursuit of a fugitive, although not legally required to do so, it would seem that he is to be governed by the same standards that would apply if it were a regular police vehicle. If he keeps within the rule laid down by the Minnesota court for traffic officers, he should be clear of responsibility for injury to others, but must stand his own loss, if any. If he drives carelessly, although at the instance of a police officer, he is responsible for all ensuing damage, excepting such as the police officer might afterwards seek to assert on his own account.

[EDITORIAL NOTE.—In the absence of a judicial interpretation of the law on the point raised by Mr. Koester, the foregoing reply by Mr. Street is published as an opinion only.

As to the effect on automobile insurance, this would be governed by the terms of the particular policy held by the individual. Some policies, for example, have a clause invalidating the policy if the car is racing with another.]

Items of Municipal Law

Water Company Entitled to Reasonable Rates from City for Service Furnished After Expiration of Franchise

Where a water company's franchise had expired and the city and the company were unable to agree as to what rates should be paid thereafter by the city for service, the old rate did not apply to service furnished. The company became entitled to reasonable rates, regardless of those fixed in the expired franchise. (United States Circuit Court of Appeals, Seventh Circuit; Quarles vs. City of Appleton, 299 Federal Reporter, 508.)

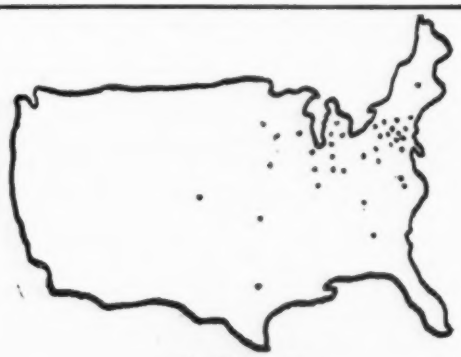
When Landowner Is Entitled to Oppose Street Abandonment

For a landowner to have a just complaint against the abandonment or closing of an abutting street, he must have a special easement in the use of the street in connection with his property for access purposes; that is, he must be specially damaged in connection with an outlet from, and inlet to, his property, otherwise he has no more interest in the street than that enjoyed by the general public for travel, and cannot prevent its closing by the owners or the public authorities. (Mississippi Supreme Court, City of Jackson vs. Welch, 101 Southern Reporter, 361.)

City May Forbid Distribution of Advertising Matter on Streets

Upholding a Jersey City ordinance prohibiting the distribution of pamphlets, etc., in the public streets, the New Jersey Supreme Court said in the case of Coughlin vs. Sullivan, 126 Atlantic Reporter, 177:

"The enactment of a reasonable ordinance regulating or prohibiting the distribution of circulars, pamphlets, and other advertising matter in such manner as will ordinarily result in the littering of streets or other public places, constitutes a valid exercise of the police power under the 'general welfare clause,' and does not contravene constitutional provisions."



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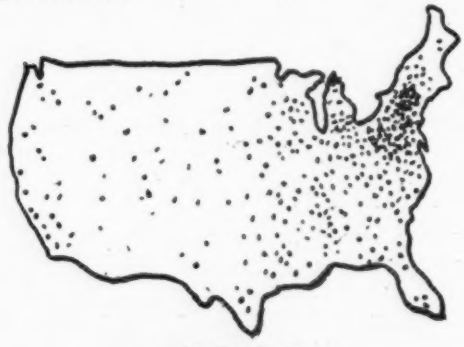

1925

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Zoning Notes

Prepared by Frank B. Williams

Author of "The Law of City Planning and Zoning"

From data collected by the Zoning Committee of New York (233 Broadway), and from other sources

For further information, Mr. Williams may be addressed in care of

THE AMERICAN CITY MAGAZINE, 443 Fourth Avenue, New York

Recent Zoning Ordinances

MONTGOMERY, ALA.—Ordinance, June 24, 1924, amended Sept. 30, 1924.

PORTLAND, ORE.—Ordinance adopted by a vote of people of city, November 4, 1924.

Recent Zoning Decisions

NEW JERSEY.—*Criterion Construction Co. v. City of East Orange and Scott, Building Inspector, Supreme Court, N. J.* Advance Reports, Vol. II, No. 47, November 22, 1924, p. 1055.

Plaza Apartment Hotel Corporation v. Hague and others, Commissioners, and Soul, Superintendent of Buildings of the City of Jersey City, Supreme Court, N. Y. Advance Reports, Vol. II, No. 9, March 1, 1924, p. 76; Court of Errors and Appeals, N. J. Advance Reports, Vol II, No. 45, November 8, 1924, p. 1625.

These two cases were decided in accordance with the so-called "Nutley case."* (Ignaciunas v. Town of Nutley, 1 N. J. Advance Reports, p. 1023.)

State of New Jersey ex rel. Plymouth Co. v. Bigelow, Superintendent of Buildings of City of Newark, Supreme Court, July 22, 1924. A provision creating as a residential district an undeveloped portion consisting of about five blocks of a business street, held to be arbitrary, unrelated to the public health, safety or general welfare, and therefore void, as not within the aims contemplated by the Zoning Statute.

NEW YORK.—*Hecht Daim Construction Co. v. Burden, Inspector of Buildings of City of Mount Vernon, Supreme Court, Westchester County,* November 24, 1924. Mandamus to compel issuance of permit for erection of a store which was refused because partly in a "Residence B" district where stores were forbidden, and because it did not comply with the provision requiring a setback of five feet from the lot lines on all four sides of the lot as required by the ordinance. The lot in question was partly in a residence, partly in a business, district; the line between them running diagonally through the lot. *Held* that the drawing of such a line was not a part of a "well-considered plan," as required by the zoning enabling act. Nor does the building line provision tend to "the conservation of property values," as the statute also requires. The building law provision also seems to be a restriction, based on esthetic considerations, and void for that reason.

It should be noted that there is no Board of Appeals in Mount Vernon, the board having been abolished. If such a board had been in existence, this case, of necessity, would have first come before it, for a variance of the letter of the ordinance, to avoid undue hardship, instead of before the Courts on mandamus.

People ex rel. Palazzolo v. Walsh, Supreme Court, reported in *New York Law Journal,* October 23, 1924, p. 317. Certiorari from a decision of the Board of Appeals of New York City which had reversed the finding of the Superintendent of Buildings of the borough of the Bronx denying an application to erect a commercial garage on a plot opposite relator's residence. The application was based upon subdivision "g" of Section 7 of the Zoning Resolution, requiring the consent of 80 per cent of the owners of frontages affected. In fact, 76.1 per cent consented. *Held* that the application to erect the garage might nevertheless be granted by the Board of Appeals as a variance of the letter of the resolution, in harmony with its spirit, to avoid unnecessary hardship, etc.

TENNESSEE.—*City of Memphis v. Spencer-Sturla Company; Circuit Court of Shelby County.* Civil action to recover a penalty for maintaining an undertaking establishment in a "Residence B" district contrary to the provisions of the zoning ordinance; the use of the building having been changed since the passage of the ordinance from residence to undertaking. *Held* that the zoning enabling acts, under which the zoning ordinance was passed, were constitutional; that they do not embrace two distinct subjects contrary to constitutional requirements; and that the provision of the zoning ordinance in question was reasonable and valid.

Recent Zoning Literature

American Society of Civil Engineers.—At the meeting of the City Planning Division of the Society in Detroit, October 24, 1924, two valuable papers with relation to zoning were presented. The first, entitled "The Purpose of Zoning Ordinances and Methods of Administration," was written by Morris Knowles, chairman of the Pittsburgh City Planning Commission. In it the writer reviews the recent progress in zoning and states the requirements of good administration. Tables showing the results of zoning in Pittsburgh are annexed. There are also notes on the subject of skyscrapers in this country and abroad, and single-family districts.

The second paper, on the subject of Zoning and Health, was presented by George C. Whipple,† Professor of Sanitary Engineering at Harvard University. The paper discusses the important subjects of light, air, congestion, and community health in relation to zoning.

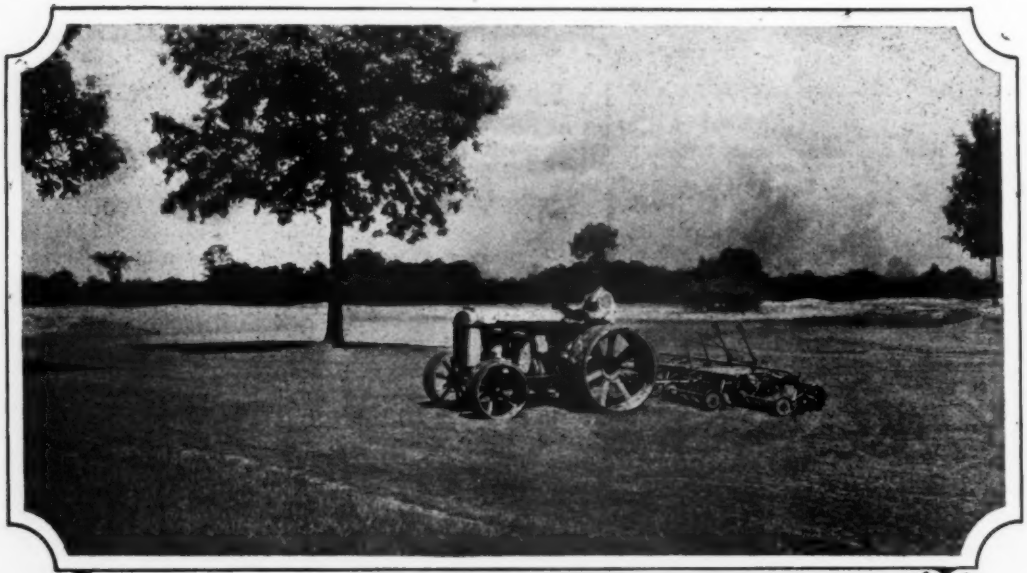
Zoning in Chicago.—The Chicago Board of Appeals has issued the following interesting statement:

October 17, 1924.

In the 1 year and 2 months ending July 1,

*See THE AMERICAN CITY, page 427, October, 1923; page 63, July, 1924; page 165, August, 1924; page 265, September, 1924.

†Deceased November 27, 1924.



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Ideal Bulldog Mowers are totally different from any other made. Regardless of what you have been using they will lower your maintenance costs. Write for literature that proves this.

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1924, since the adoption of the Chicago zoning ordinance, the following amendments have been enacted:

Number of amendments	99
Number of amendments lowering the standards	67
Number of amendments raising the standards	32

For the purpose of comparison it seems advisable to tabulate the amendments in terms of miles of frontage of property, the blocks being quite regular in shape and size.

The total ultimate street frontage in Chicago is 4,700 miles within its present corporate limits.

	Miles of Frontage Amended	Percentage of Total in City
All amendments	65.5	1.4
Standards lowered	53.0	1.1
Standards raised	12.5	.3

A further subdivision of the amendments reveals the following:

Standards lowered as to use	14.0
Standards raised as to use	11.0
Standards lowered as to volume	38.3
Standards raised as to volume	.4
Standards lowered, use and volume	.7
Standards raised, use and volume	1.1

The use districts provided by the ordinance are Residence, Apartment, Commercial, and Manufacturing.

The Volume districts are 1st, 2d, 3d, 4th and 5th, the 1st being the most restrictive and permitting a cubic content of building of 10 times the lot area, with a slight relaxation for corner lots.

By lowering the standards is meant changing from a use class or from a bulk or volume class to one less restrictive.

Zoning in Boston.—The Boston Real Estate Exchange Bulletin of October, 1924, contains an account of the progress of zoning under the Zoning Law for the City of Boston (Ch. 488, of the Acts of 1924).

Zoning Technique.—The division of Housing and Town Planning of the Department of Public Welfare of Massachusetts under date of October, 1924, has issued a report entitled "Zoning Technique."

Edward M. Bassett, Esq., counsel of Zoning Committee of New York and Director of Legal Division of Regional Plan of New York and Its Environs, has written an article appearing in the December issue of THE AMERICAN CITY, entitled "Fields of Progressive Legislation for Better City Planning." A portion of the article is devoted to the consideration of zoning enabling acts.

The Municipal Bond Market

By Sanders Shanks, Jr.

Editor, *The Bond Buyer*

WHEN complete results of the December bond sales are known, the grand total of state and municipal bonds issued in 1924 will exceed the 1921 figure, which was the greatest ever reached in state and municipal bond history. At present it is only possible to make an estimate for the year 1924, which amount the writer estimates conservatively as $1,390,000,000. The total for 1921 was $1,383,368,900. It must be remembered, however, that the 1924 total was swelled greatly by the fact that New York City was in the market in June and floated a bond issue of $137,500,000, $67,400,000 of which was taken by investment bankers, and $70,100,000 by city sinking funds. The accompanying table shows the total amount of financing done during the past eight years.

Yearly Totals of State and Local Borrowings

1917	$ 444,932,848
1918	262,818,844
1919	770,195,248
1920	773,663,986
1921	1,383,368,900
1922	1,279,553,134
1923	1,111,159,388
1924 (Est.)	1,390,000,000

All through the current year, despite the fact that tax reduction was being discussed in Congress, the demand for tax-exempt state and municipal bonds increased steadily and prices gradually returned to the high level of 1922. In December, however, the demand slackened, resulting in a very slight drop in market values.

The ready absorption of a record volume of state and munuicipal bonds during the year was made possible by the investment activities of banks and other institutions. Perhaps the most interesting development of the year in the municipal bond business is the return of bank buying to a position of first importance marketwise. From 1918 to 1923, the wealthy private investor furnished the principal support to the tax-exempt bond market.

The following is a list of the most important issues floated during the month of December:

Amount	Borrower	Maturity	Coupon Rate %	Net Yield %
*$3,000,000	Philadelphia, Pa.	1954	4	3.87
1,400,000	Syracuse, N. Y.	1926-65	4	3.99
1,429,000	Bergen Co., N. J.	1925-46	4½	4.32
457,212	Utica, N. Y.	1925-44	4¼	4.08
2,936,000	Cleveland, Ohio	1926-50	4½, 4¾, 5	4.33
1,276,000	Paterson N. J.	1925-64	4½	4.84
1,725,000	Canton, Ohio	1926-48	4½	4.35
1,000,000	Multnomah Co., Ore., S. D., No. 1 (Portland)	1927-44	4½	4.45
1,000,000	York Co., S. C.	1926-50	4¾	4.72
800,000	Everglades Drainage Dist., Fla.	1932-49	5½	5.63

* Purchased for city sinking funds.

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Municipal and Civic Publications

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Public Utility Regulation.—Edited by Morris Llewellyn Cooke, M. E., Sc. D., Consulting Engineer; Director, Giant Power Survey, Commonwealth of Pennsylvania, and formerly Director of Public Works, Philadelphia. The Ronald Press Company, New York, 1924. IX + 310 pp. $3.25 postpaid.

This volume has been prepared not only as a textbook in political science and government, treating regulation "as a living, growing and changing policy of government," but also for the use of public officials and public utility officials and investors. The authors of the chapters are men experienced in public service, who understand both the public and the private point of view. On important matters of dispute the views of recognized experts are given. The chapters are as follows: Introduction, by Felix Frankfurter: The Field of Regulation, by Ernest S. Bradford; Federal Courts and Utility Regulation, by Milo R. Maltbie; Regulation and the Franchise, by Charles M. Fassett; Major Problems Presented to State Commissions, by Donald R. Richberg; Service Standards—Foreword, by the Editor, Electric, by Clayton W. Pike, Water, by Delos F. Wilcox, Gas, by Willard F. Hine, Electric Railways, by Roy Husselman, Telephones, by Munson D. Atwater; Bases of Rate Making, by C. W. Koiner; Holding Companies and the Authorization of New Capital Issues, by John Bauer; Cost Finding as an Aid to Effective Regulation, by H. K. Hathaway; The Public Service Commissionership as a Factor in Government, by Morris L. Cooke; Cooperation Between State and Local Authorities, by Delos F. Wilcox; The Technique of Actual Cases, by E. S. Bradford; Regulation of Motor Conveyances, by Benj. H. Williams; Labor Policies and Public Utilities, by Henry T. Hunt; Current Public Opinion and the Public Service Commissions, by Charles E. Merriam and Harold Lasswell; Nation-wide Organization of the Utility Industries, by Morris L. Cooke.

Community Advertising.—By Don E. Mowry, General Secretary, Madison (Wis.) Association of Commerce; Chairman, Extension Committee, Community Advertising Department of The Associated Advertising Clubs of the World. Cantwell Press, Madison, Wis. 1924. XVI + 456 pp. $4.25, United States; $5.00, Canada.

A book for city managers, mayors and other city officials, commercial executives, realtors, school superintendents, convention secretaries, exposition managers, civic clubs, and all others interested in the development of communities. The main idea is that the community must be made to know itself in relation to other communities and that its liabilities must be eliminated before the advertising can become effective. The subject matter is comprehensive, detailed, and incisively presented, under the divisions: Community Advertising Fundamentals; Objectives; Machinery; Mediums; Technique; and Accomplishments.

Town Planning in the Federated Malay States.—Third Annual Report of Charles C. Reade, Government Town Planner. 14 large pp., besides folding plans. Since the publication of the second annual report a program of organization and development extending over the years 1924-26 has been issued and discussed, and the work of the department has greatly increased. This report covers (1) general remarks and illustrations on town planning progress in the Federated Malay States, and (2) particulars of work and developments during 1923. The four plans show the character and progress of land and road development for the important town of Kuala Lumpur. (Apply to the Government Town Planner, Government Buildings, Kuala Lumpur, Federated Malay States.)

Heart Disease.—A group of articles in The Survey, Graphic Number, November 1, 1924, by physicians and laymen. These writers "are united in the conviction that heart disease is preventable and curable; that its prevention and cure make up one of the biggest jobs now before health workers; that the public can learn to reduce mortality from this cause as it has learned to deal with the white plague and is gradually learning to deal with cancer." (Apply to The Survey, 112 East 19th Street, New York, N. Y.)

Savannah Water Department.—History of the Department, 1822 to 1923. By John G. Valentino, Superintendent. 7 pp. An interesting account of the progress made by this department, which is stated to have the lowest water-rates of any city in the entire Southeast. (Apply to the Superintendent, Savannah, Ga.)

Lighting in Relation to Public Health.—By Janet Howell Clark, Associate Professor of Physiological Hygiene, School of Hygiene and Public Health of the Johns Hopkins University. William & Wilkins Company, Baltimore, Md. 1924. 185 pp. Illustrated. $4.00 postpaid.

This book has been prepared not only to serve classroom use, but also to provide a simple, condensed reference work for public health workers upon the relation of illumination to physical well-being. The chapter titles are: Units and Standards; The Measurement of Illumination; The Development of Illumination; Reflectors; Sufficient Illumination; Glare; Best Conditions for Visual Efficiency; Lighting of Schools; Factory Lighting; Other Interior Illumination; Exterior Lighting; Occupational Eye Diseases from Low Illumination; Pathological Effects of Radiant Energy on the Eye; Occupational Eye Diseases Attributed to Excessive Light and Heat; Protective Glasses and Glasses for Refractive Errors.

The Fundamental Concepts of Public Law.—By Westel W. Willoughby, Professor of Political Science, Johns Hopkins University; Tagore Professor of Law, 1923, University of Calcutta. The Macmillan Company, New York. 1924. XVII + 499 pp. $4.00.

A profound analysis of the understanding which jurists have of the nature, authority and duties of the State, with an examination of court decisions in which these concepts have found application.

Working Manual of Original Sources in American Government.—By Milton Conover. The Johns Hopkins Press, Baltimore. 1924. VII + 135 pp. $1.50 postpaid.

A supplement to collegiate text-books on American government, giving problems which introduce the student to original sources of information on the government of nation, state, city, county, township, town and village. The topic of the City Government section is Municipal Year Books, and the General Problem is: "To survey the history, organization and functions of city government as revealed in municipal year books and annual reports of city officials."

The Stunt Treasury.—Published by The Gavel Wielders, 123 West Madison Street, Chicago. 1924. 95 pp. $1.00.

A compilation of means of furnishing entertainment at little or no cost to societies and organizations of all kinds, including suggestions for increasing attendance and eliminating difficulties. The ideas presented are for use at general meetings, outdoor affairs, ladies' nights, stags and smokers, and special days. They include many excellent program features designed to promote fun, friendliness and membership loyalty.

The Automobile—Its Province and Problems.—The November, 1924, issue of The Annals of the American Academy of Political and Social Science, 39th Street and Woodland Avenue, Philadelphia, Pa. VII + 292 pp. "Not a phase of American life has been untouched by the automobile." The editor in charge of this volume is Clyde L. King. It contains 50 articles grouped under the following divisions: The Services of the Automobile; The Manufacture and Sales of Automobiles; The Automobile, the Home, the School and the Church; The Place of the Motor in Our Transportation System; The Building and Financing of Motor Highways; Safety of the Highways Through Traffic Regulation; City Plans for Motor Traffic; International Problems Growing Out of the Development of the Automobile Industry; The Service of Automobile Associations and the Universities. (Apply to The Annals.)

First Report of the Committee on Education of Associated Industries of New York State.—Published by Associated Industries of New York State, Inc., 701-704 Iroquois Building, Buffalo, N. Y. This organization is made up of 2,500 of the largest manufacturers in the state, giving employment to nearly three-quarters of a million people. The report embodies the conclusions of the Committee as to those features of education of less than college grade and under public supervision and control which have been heretofore largely neglected, but which are essential to the best and largest interests of employers, employees, and society in general. (Apply to Mark A. Daly, General Secretary, Associated Industries of New York State, address above.)

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The National Fire Waste Council.—Fire Prevention Bulletin of the Insurance Department of the Chamber of Commerce of the United States. Number Fourteen. Prepared for the purpose of acquainting the Public with the National Fire Waste Council and the work it is doing. 4 quarto pp. The Council is made up of seventeen leading national organizations and three governmental bureaus, and assists chambers of commerce in the solution of their fire prevention problems. (Apply to the Chamber of Commerce of the United States, Mills Building, Washington, D. C.)

Community Trusts.—Two pamphlets: "The New York Community Trust," 34 pp., setting forth the great need of intelligent use of bequest funds, and the principles and purposes of a Community Trust, with special reference to the New York Community Trust and with many authoritative comments of approval of this means of making benevolence effective; "The Community Trust as Viewed by Lawyers," pocket size, 16 pp., giving the approval of representative lawyers, with further information about the purpose and the functions of the Community Trust. (Apply to Ralph Hayes, Director, The New York Community Trust, 120 Broadway, New York, N. Y.)

The Cost of Education in California.—A statistical study of the costs for elementary, secondary, and higher education in the state, based on the returns for the school year 1921-1922. A report reviewed and presented by the Educational Finance Inquiry Commission under the auspices of the American Council on Education, Washington, D. C. This report was prepared for the Commission by Jesse B. Sears and Ellwood B. Cubberley, of the staff for California. Published by The Macmillan Company, New York. 1924. XVIII + 353 pp. Tables, graphs. Valuable for state superintendents of education who wish to make reports on the cost of education in their own states. $1.25. (Apply to the publishers.)

Water-Supply Reports, Bayonne, N. J.—Report on Water Supply to Hon. Harry Hosford, Director, Department of Revenue and Finance, by Weston and Sampson, Consulting Engineers (Thomas H. Wiggin, Associate Engineer; James F. Sanborn, Geologist), also Report of Citizens' Committee of Twenty, and Report of Its Consulting Engineer, Weston E. Fuller. 116 pp. Maps, drawings, tables. A detailed study of the situation, with definite recommendations for Bayonne involving the city's support of any reasonable plan pooling the interests of the various municipalities. (Apply to Robert Spurr Weston, 14 Beacon Street, Boston, Mass.)

How Modern Traffic and the City Plan Affect Distribution of Paving Costs.—By W. W. Horner, Chief Engineer, Sewers and Paving, St. Louis. 6 pp. in the November, 1924, issue of the National Municipal Review. An explanation of how St. Louis distributes the cost of streets among the citizens and makes possible the paving of the major thoroughfares without undue hardship or injustice to the property in the vicinity. The plan follows very closely the Federal-aid policy of general highway construction. (Apply to the National Municipal League, 261 Broadway, New York, N. Y.)

Public Library of the District of Columbia.—Annual Report of Board of Trustees and Librarian for fiscal year ended June 30, 1924. 19 pp. Containing a table of municipal library expenditures and circulations per capita, 1923 or 1924, using the Census Bureau's corrected population figures as of July 1, 1923. George F. Bowerman is the Librarian. (Apply to the Government Printing Office, Washington, D. C.)

The "Main Street" Through Arizona.—A pictorial account of the construction of the nearest-completed east-and-west highway from El Paso, Tex., to the Pacific Coast—the official route of the Old Spanish Trail and the Bankhead Highway. It is a state highway and approved by the Federal Government all the way from El Paso to San Diego. The booklet measures 13¾ x 6½ inches; 32 pp.; map and many views. It was compiled by A. H. Gardner, of Tombstone, Ariz., for the Tombstone Commercial Club. (Apply to the Club.)

Why the Coroner System Has Broken Down.—By Alexander O. Gettler, M. A., Ph. D., Associate Professor of Chemistry, New York University Medical College; Toxicologist to Chief Medical Examiner's Office of New York City, Pathologist Chemist to Bellevue and Allied Hospitals. 8 pp. In the National Municipal Review for October, 1924. Six cases are given illustrating the nature and importance of the work involved in the scientific determination of the cause of violent death. The essential constitution of a typical medical examiner's system is presented. Justice is shown to be outside the power of the old-fashioned coroner. (Apply to the National Municipal League, 261 Broadway, New York, N. Y.)

Traffic Control Systems.—By C. A. B. Halvorson, Jr., Designing Engineer, Street Lighting Department, General Electric Company, River Works, West Lynn, Mass. A paper presented before the annual convention of the Illuminating Engineering Society, Briarcliff Manor, N. Y., October, 1924. 20 pp. Also the supplement (12 pp.) to this paper, giving traffic control diagrams with colored symbols. A discussion of systems in relation to the degree of safety which they give to the pedestrian, as well as their control of vehicles. Interesting illustrated material on the design of signals and switching devices. 20 pp. (Apply to the Illuminating Engineering Society, 29 West 39th Street, New York, N. Y.)

A Regional Plan for the Philadelphia Metropolitan District.—The report of a preliminary survey made under the direction of a citizens committee and published by order of the committee, November 15, 1924. 36 pp. Folding map. The survey was supervised by a group of eight technical and engineering advisers, and the active work was done by Howard Strong. The report makes clear the importance of regional planning for cities, and the pressing need of it for the Philadelphia region. The problems of circulation, traffic, housing, schools, recreation, water-supply,, sewerage, and others are presented in their relation to the present and the future of Philadelphia, and a program is proposed for further study and publicity through well-organized committees, leading to the ultimate development of a regional plan. (Apply to Committee on Regional Plan for the Philadelphia Metropolitan District, 313 South Broad Street, Philadelphia, Pa.)

Zoning Technique.—Bulletin No. 2 of the Division of Housing and Town Planning, Department of Public Welfare of Massachusetts, October, 1924. By Edward T. Hartman, State Consultant on Housing and Planning, State House, Boston, Mass. 8 pp. A helpful discussion, for planning boards and others, of the essential steps of zoning, the purpose of each step, and the methods of performing each operation. (Apply to author.)

Digest of Laws Prohibiting the Use of the Common Drinking Cup.—Compiled October, 1924. Published by the General Health Bureau, 542 Fifth Avenue, New York City. 25 pp. Analytical comment on the legislative progress made in this field and on the need for the future, followed by excerpts from the Standard Railway Code, and the individual state laws on the subject. (Apply to the publishers.)

The Civic Club of Philadelphia.—Thirtieth Annual Report, 1823-1924. Also report of the thirtieth anniversary of the Club, committee reports, membership list, and other information regarding the work of this very active organization. (Apply to the Secretary, Mrs. Imogen B. Oakley, 1300 Spruce Street, Philadelphia, Pa.)

"Public Relations" in the Public Utility Industry.—An address by Bernard J. Mulianey, Vice-President of the Peoples Gas Light & Coke Company of Chicago, before the students of the College of Commerce, University of Illinois, Urbana, Ill., May 24, 1924. Harmonious relations between an informed public and the service companies are of value not only to the particular company concerned, and to the industry, but also, in the long run, greatly to the community, "because the effect of it all is in the direction of better service at lower rates." (Apply to Publications Committee, 72 West Adams Street, Chicago, Ill.)

Government Ownership.—An address by Hon. Herbert Hoover, Secretary of Commerce, delivered in Washington, D. C., September 29, 1924. A strong argument against Senator La Follette's proposal of government ownership and operation of railway and other public utilities. (Apply to the U. S. Department of Commerce, Washington, D. C.)

Good Roads Everywhere.—A large road map of the United States, published under the joint auspices of the National Highways Association, Washington, D. C., and The Automobile Club of America, 12 East 53rd Street, New York, N. Y., and for 42 highway organizations. Setting forth the importance of a four-fold system of highways—national, state, county, and township—each system built and maintained by its own political authority. $1.00. (Apply to the Automobile Club of America.)

Chicago's Clearer Skies.—The October 4, 1924, issue of the Weekly Bulletin of the Chicago Department of Health. 8 pp. Illustrated. Showing how well the citizens of Chicago are cooperating with the Department of Health against the smoke nuisance, what the cost of needless smoke is, and how to accomplish smokeless firing with less coal. (Apply to the Department of Health.)

New York State Department of Health.—Annual Report for 1922. 271 pp. Tables. (Apply to the Department, Albany, N. Y.)

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Regional Plan of New York and Its Environs.—Two pamphlets: Report of a conference held in the Town Hall, New York City, May 20, 1924, on Traffic Problems in Their Relation to the Regional Plan of New York and Its Environs, 48 pp., 25 cents; Second Report of Progress February, 1923, to May, 1924, including a report of a meeting held on May 20, 1924, and a complete summary of studies made up to May, 1924, 47 pp., 25 cents. (Apply to Regional Plan of New York and Its Environs, 130 East 22nd Street, New York, N. Y.)

Assessed Valuation of Ohio Cities.—Table showing assessed valuation, personal and total, also per capita assessed valuation and tax rate. 2 mimeographed pp. Giving 1922 census population figures; 1924 assessment figures represent 1923 appraisements. The 1922 figures compiled from "Financial Statistics of Cities 1922," recently published by U. S. Bureau of the Census. (Apply to C. O. Hanes, Secretary, Steubenville Chamber of Commerce, Steubenville, Ohio.)

A Twenty-Five Year Review of Water Supply Conditions and Typhoid Fever Mortality in New York State Cities.—By H. Burdett Cleveland, consulting sanitary engineer, 38 Park Row, New York, N. Y. Reprinted from The Nation's Health, October, 1924. 3 quarto pp. Tables, diagrams. The title of the article is "Purification of Water Supply Is Greatest Typhoid Preventive." (Apply to the author.)

Salaries of Village Officials in Wisconsin, 1924.—Information Report No. 40 of the Municipal Information Bureau, University Extension Division, University of Wisconsin, Madison, Wis. September, 1924. Compiled by Gladys D. West, from information secured by a questionnaire sent to the 347 villages of the state and replied to by 294. 15 mimeographed pp. Tables. (Apply to Ford H. MacGregor, Chief of the Bureau.)

Protecting the City Plan—The Next Steps.—Bulletin No. 16 (November, 1924) of the Massachusetts Federation of Planning Boards. By Philip Nichols. 20 pp. Citations of court decisions relating to the prevention of building in mapped streets, and suggestions for a statute on the subject. Apply to Edward T. Hartman, Executive Secretary of the Federation, 37 State House, Boston, Mass.)

Report of Board of Transportation to the Board of Estimate and Apportionment, New York City, on Petitions for Omnibus Franchises.—A very comprehensive study of the situation, published October 15, 1924, under the divisions: Discussion of Policy; Applications for Franchises; and Summary of Routes and Applications. Recommending the granting of short-period franchises for omnibus lines upon conditions that would safeguard the interests of the city and the protection of the traveling public. These conditions are fully set forth. The Board was assisted in this study of the bus problem by F. Van Z. Lane, Division Engineer, former Manager of the Jersey City Chamber of Commerce. 100 pp. (Apply to the Board of Transportation, 49 Lafayette Street, New York, N. Y.)

The Banker's Place in the Real Estate Mortgage Field.—An address by Frank J. Parsons, Vice-President, United States Mortgage & Trust Company, before the Savings Bank Division of the American Bankers Association, in Chicago, September 29, 1924. 16 pp. Also "Elements of Safety in City Mortgages," by the same author; 15 pp. "It seems needless to dwell upon the admitted advantages to the banker in taking a lively interest in all matters which bind men to their communities through the fostering of home-ownership and the legitimate expansion of their business properties." (Apply to United States Mortgage & Trust Company, 55 Cedar Street, New York, N. Y.)

New Raritan River Bridge and Albany Street Roadway Widening, New Brunswick, N. J.—Report of the City Planning Commission of New Brunswick, by Herbert S. Swan, city planner, 15 Park Row, New York, N. Y. 1924. 24 quarto pp. Views, drawings, folding maps. "It is a new bridge, and only a new bridge, that offers the hope of solving the traffic problem in New Brunswick along permanent lines." (Apply to Mr. Swan.)

Building Officials' Conference.—The Proceedings of the Tenth Annual Meeting, held at Louisville, Ky., April 8-10, 1924 162 pp. Illustrated. Among the interesting topics discussed are the following: Report on Sprinkler Requirements; Efficiency in a Building Department; The Relationship Between the Architect and the Building Inspector; The Building Inspector as He Appears to the Public; The Scope and Limitations of a Building Code; Some Legal Aspects of Building Codes and Their Enforcements. (Apply to the Secretary of the Conference, J. F. Downey, Cambridge, Mass.)

Local Transportation, Chicago.—Report to the Committee on Local Transportation of the City of Chicago on the Immediate Construction of Subways. By R. F. Kelker, Jr., consulting engineer. October 20, 1924. 52 quarto pp. Maps. Recommending a rapid-transit system consisting of subways and elevated railroads which could be operated independently of any negotiations with the existing transportation; immediate construction to be financed by use of the Traction Fund. (Apply to I. Lee Sears, Secretary, Committee on Local Transportation, Room 202D, City Hall, Chicago, Ill.)

Municipal Reports Received

CHICAGO, ILL.—Report of the Comptroller, 1923

CHICAGO, ILL.—Annual Report, Department of Gas and Electricity, 1923

CLEVELAND, OHIO.—City Manager's Annual Estimate, for 1925

HARTFORD, CONN.—Annual Report, Board of Park Commissioners, and Annual Report, Public Cemeteries, year ending March 31, 1924

KEWANEE, ILL.—Annual Reports, Municipal Officers, year ending April 30, 1924

PHILADELPHIA, PA.—Annual Report, Bureau of Highways, 1923

On the Calendar of Conventions

JANUARY 5-6.—CHICAGO, ILL.
International Association of Street Sanitation Officials. Annual conference. Secretary, A. M. Anderson, 10 South La Salle Street, Chicago, Ill.

JANUARY 6-9.—CHICAGO, ILL.
American Road Builders' Association. Annual convention and Road Show. Secretary, Ethel A. Birchland, 37 West 39th Street, New York, N. Y.

JANUARY 12-14.—BOSTON, MASS.
American Society of Landscape Architects. Annual meeting. Secretary, Bremer W. Pond, 18 Tremont Street, Boston, Mass.

JANUARY 16-17.—WASHINGTON, D. C.
American Engineering Council. Annual meeting. Executive Secretary, L. W. Wallace, 26 Jackson Place, Washington, D. C.

JANUARY 19.—NEW YORK, N. Y.
American Institute of Consulting Engineers. Annual meeting. Secretary, P. W. Henry, 111 Broadway, New York, N. Y.

JANUARY 21-23.—NEW YORK, N. Y.
American Society of Civil Engineers. Annual meeting. Secretary, George T. Seabury, 33 West 39th Street, New York, N. Y.

JANUARY 22.—CHICAGO, ILL.
American Forestry Association. Annual meeting. Executive Secretary, Ovid M. Butler, 1523 L Street, N. W., Washington, D. C.

JANUARY 26-31.—AUSTIN, TEX.
Texas Section of the Southwest Water Works Association. Annual Short School for Filter Plant Operators. Secretary, V. M. Ehlers, Sanitary Engineering Division, State Board of Health, Austin, Tex.

JANUARY 27-28.—CRETE, NEBR.
League of Nebraska Municipalities. Annual convention. Secretary-Treasurer, Theo. H. Berg, Lincoln, Nebr.

JANUARY 28-30.—BOSTON, MASS.
American Society of Heating and Ventilating Engineers. Annual meeting. Secretary, F. C. Houghton, 29 West 39th Street, New York, N. Y.

FEBRUARY 5-6.—MINNEAPOLIS, MINN.
Minnesota Association of Community Secretaries. Annual convention. Acting Secretary, H. F. Dooley, Faribault, Minn.

FEBRUARY 9-12.—NEW YORK, N. Y.
American Institute of Electrical Engineers. Midwinter convention. Secretary, F. L. Hutchinson, 33 West 39th Street, New York, N. Y.

FEBRUARY 21-27.—CINCINNATI, OHIO.
National Education Association, Department of Superintendence. Annual meeting. Secretary, Dr. S. D. Shankland, 1201 16th Street, N. W., Washington, D. C.

FEBRUARY 24-27.—DETROIT, MICH.
American Concrete Institute. Annual meeting. Secretary, Harvey Whipple, 1807 East Grand Boulevard, Detroit, Mich.

APRIL 27-MAY 2.—LOUISVILLE, KY.
American Water Works Association. Annual convention. Secretary, W. M. Niesley, 170 Broadway, New York, N. Y.

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is a self contained organization, operating its own flying equipment and using the K-3, between-the-lens shutter, camera, developed for the United States Government by its parent corporation, Fairchild Aerial Camera Corporation. In the production of Aerial Photographic Maps or Aerial Line Maps a highly trained personnel of engineers only is employed.

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FAIRCHILD AERIAL SURVEYS

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136 W. 52nd St. New York City

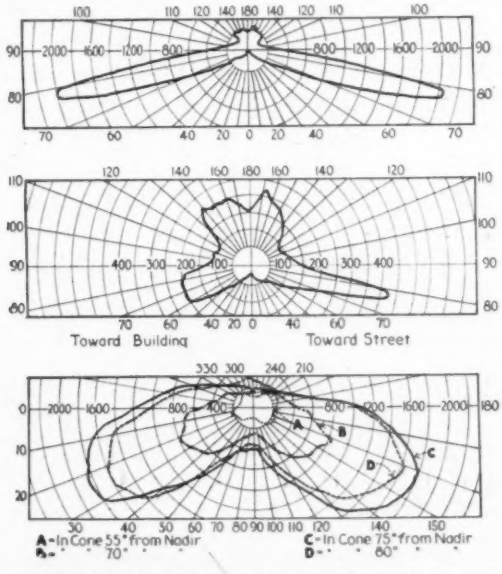
News and Illustrations

Items of Interest to City, Town and County Officials, and Others Interested in the Economical Construction and Efficient Operation of Public Improvement Undertakings

More Light on the Street and Less on the Front Porch

The development of a device which would produce asymmetric distribution of illumination, that is, place more light on the street and less in the front yard or on the house, was announced last year at Lake George, N. Y., when street-lighting officials of the Westinghouse Electric & Manufacturing Company, South Bend, Ind., demonstrated the Bi-lux refractor. This device produces a graduated distribution of light on the street surface by refracting prisms. It is designed to build up two wide paths of light, diverging in opposite directions up and down the street. This is accomplished by intercepting part of the light from the direction of the building, part from the direction across the roadway and then bending it into the main luminous beam. The angle of maximum distribution of the two main beams is 22½ degrees from the curb line toward the roadway. The intensity is so graduated that an evenly distributed light is spread on the street surface.

The Bi-lux refractor consists of two cylindrical elements of crystal glass, nested one within the other and clamped together so as to form a single unit which is the shape of the frustum of a hollow cone. A series of horizontal prisms on the inner element bend the light flux downward in the direction of the street surface, while a series of vertical prisms on the outer element bend the light rays into the two main beams. The minimum distribution is in the direction of the sidewalk at right angles to the curb line, while a slightly increased intensity is directed across the road in the opposite direction. The resultant illumination is evenly distributed, with glare reduced to a minimum.



DISTRIBUTION CURVES OF LIGHT FROM BI-LUX REFRACTOR

Characteristic distribution curves of this refractor are shown in the accompanying illustration. With a 4,000-lumen Mazda lamp, the light is equivalent to 2,000 candle-power up and down the street, 425 candle-power across the roadway, and 225 candle-power in the direction of the building or the front porch.

This refractor controls practically all of the light from a lamp with the exception of a small portion of the upward illumination. This upward light, which is small compared with the total output of the lamp, may be redirected if desired by means of a specially designed reflector, or it may be utilized for illuminating the building fronts by equipping the lighting unit with a glass canopy. This is desirable in down-town streets to bring out the details of the architecture of the buildings.

Another interesting development in asymmetric units for ornamental street lighting has been made with octagonal lanterns equipped with refracting panels designed to produce results similar to those obtained with Bi-lux refractors. In this case, three of the panels toward the building side have the characteristics of reflectors, permitting a small amount of light to pass through, while the others are refracting panels which bend the light flux up and down the street.

A Newly Developed Chlorine Control Apparatus for Water and Sewage

The advantages of chlorine for the sterilization of municipal water-supplies and of sewage disposal plant effluent, are too well known to need discussion at this time. A new type of chlorine control equipment for this service has been developed by the Paradon Engineering Company, 24 South Washington Place, Long Island City, N. Y. The special features which the manufacturers claim for this new apparatus are: its simplicity, as the number of usual parts has been reduced to less than half; its rugged construction; its standard fittings; its durable finish; the fact that it is self-contained, mounted on a pedestal or a wall bracket or combined with platform scales; and that it has vacuum relief, which prevents water from being drawn into the apparatus by the vacuum formed by the absorption of chlorine remaining in the unit when shut down; this also eliminates so-called flooding. This outfit has a movable chlorine inlet valve in which the seat and stem are a unit and not detachable. This eliminates the possibility of the valve's getting out of adjustment in the field. The flow of

A Telegram on the Measurement of Sewage

Form 1206A

CLASS OF SERVICE DESIRED
Telegram
Day Letter
Night Message
Night Letter
Patrons should mark an X opposite the class of service desired; OTHERWISE THE MESSAGE WILL BE TRANSMITTED AS A FULL-RATE TELEGRAM

WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT — GEORGE W. E. ATKINS, FIRST VICE-PRESIDENT

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BALTIMORE MD APR 15 1924 1212P

BUILDERS IRON FOUNDRY

GAS BLG CHICAGO

REPLYING TO YOUR INQUIRY THE VENTURI METER IS STANDARD EQUIPMENT FOR MEASURING THE FLOW OF SEWAGE IN ENCLOSED CONDUITS AND IS USED IN VARIOUS CITIES PERSONALLY I INSTALLED FORTY EIGHT INCH AND TWENTY INCH VENTURI SEWAGE METERS IN COLUMBUS OHIO SOME SIXTEEN YEARS AGO AND TWENTY FOUR INCH METER IN AUSTIN TEXAS SIX YEARS AGO THERE ARE FIVE FORTY TWO INCH VENTURI SEWAGE METERS IN THE BALTIMORE SEWAGE DISPOSAL WORKS.

JOHN H GREGORY C E

JOHNS HOPKINS UNIVERSITY

Hundreds of Venturi Meters throughout the United States and Canada, successfully measuring sewage, lend daily emphasis to the reliability of the Venturi for this difficult service.

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BUILDERS IRON FOUNDRY

PROVIDENCE, R. I.

Builders of the Venturi for 33 Years

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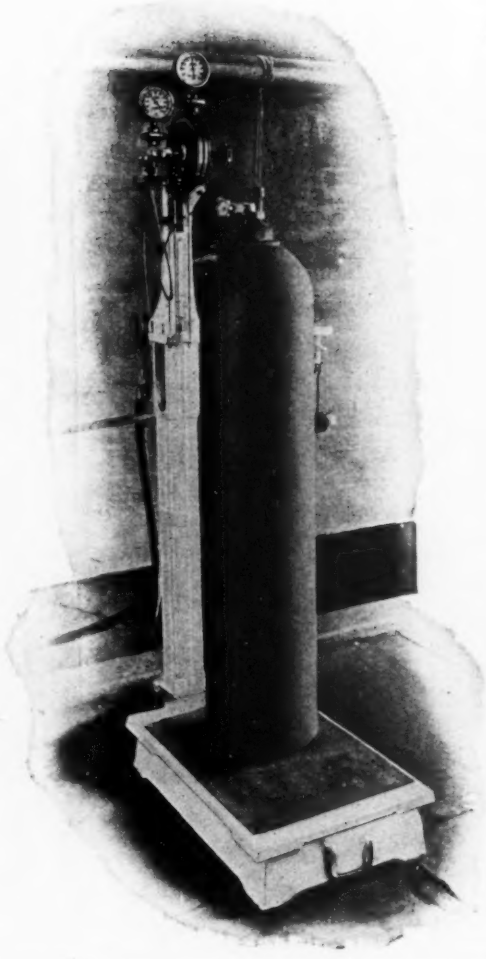


CHLORINATOR AND SCALES AT THE NORRISTOWN, PA., FILTER PLANT

chlorine is regulated by the variation of the tension of a diaphragm, which in turn is connected to the chlorine inlet valve, making the use of a needle valve unnecessary. Both the inner and outer manometer tubes of the chlorine meter are removable.

The Types D and DB equipment are manually set, and the regulator valves of the equipment maintain the feed within close limits. The Type D equipment, which is for small flows from 0.03 to 6 pounds of chlorine per day, has a regulator which maintains a constant-pressure drop across a small variable orifice or control valve. A constant-pressure valve maintains a constant density of gas passing through this orifice, and a small volumetric meter indicates the amount of gas being fed. In the larger Type DB equipment, which is for flows from 1 to 300 or more pounds of chlorine per day, a regulator varies the pressure drop across a fixed orifice. A constant-pressure valve maintains a constant density of gas through this orifice, and a manometer connected to either side of the orifice indicates the amount of gas flowing. Each fixed orifice has its own scale individually calibrated.

The chlorine may be delivered from the equipment as a dry gas and introduced directly through diffusing apparatus, or a water injector may be included in the unit and the chlorine delivered from this injector to the water or sewage to be treated.

One of the features of this equipment is the combined standard and platform scales on which the apparatus is mounted. Standard apparatus and scales are white vitrified enamel, making a distinctive unit for plant installation. Engineers and health officials recommend the use of scales to enable accurate records to be kept of the total chlorine applied and to facilitate the change of cylinders. By building the scales into the unit a distinct forward step has been taken.

Universal Crane Enlarges Offices

Because of the growth of the business of the Universal Crane Company the general offices of the company in Cleveland have been considerably enlarged, but the location, Ninth and Euclid Avenue, Cleveland, near the Statler Hotel, has not been changed. The new quarters are in Suite 914, instead of 1106, as formerly.

New Los Angeles Office and Warehouse

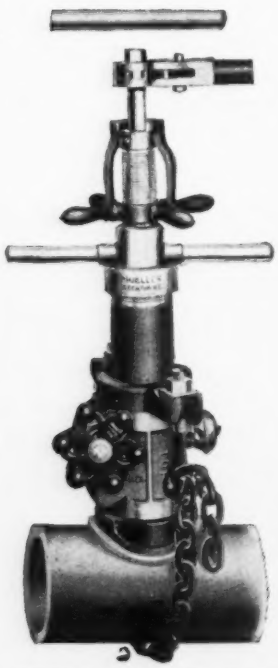
The Sullivan Machine Company, 122 South Michigan Avenue, Chicago, Ill., has announced the establishment of a branch office and warehouse at 412 E. Third Street, Los Angeles, Calif., with Benjamin P. Lane as Local Manager. A complete stock of Sullivan air compressors, hammer drills, concrete breakers and air-lift equipment will be carried, as well as spare parts and supplies for this complete line.

C. D. Edwards Manufacturing Company Expands

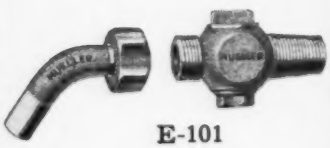
The C. D. Edwards Manufacturing Company, Albert Lea, Minn., has announced that J. W. Hutchinson, formerly General Manager of Smith & Sons Manufacturing Company of Kansas City, is now associated with it and will have charge of the sales of the Edwards line in the western portion of the United States. His office will be located in California or Washington.

The first unit of the new Edwards factory is now completed. It is a warehouse 210 feet long by 90 feet wide, with brick walls and concrete floor. Within another six months the first factory unit will be started and will be the same size as the warehouse and placed at right angles to it. The foundry, 100 feet square, will follow, together with several small outbuildings which are needed for the storage of raw materials, coal and coke.

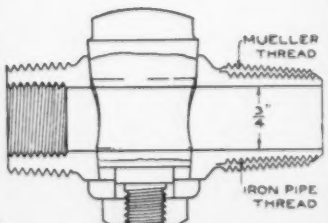
Thorough tests have just been completed, so that the C. D. Edwards Manufacturing Company is now placing on the market a 2,900-pound, 7-foot grader built along the same lines and design as its other models. It will be known as the Edwards Chief Standard. At the opening of the spring season this company will have two graders in the 7-foot field, namely, the Lighting Standard, weighing 1,800 pounds, and the Chief Standard, weighing 2,900 pounds.



"B" Tapping Machine



E-101



Mueller Thread

Stop Time Waste in Tapping

Keep tab on your tappers time. When the job takes too much time — examine both machine and tools. You will probably find them old and worn. A small investment in new equipment will likely save much more in labor costs.

The New MUELLER *"B" Machine*

is used by practically every Water Works in the United States, because it lowers tapping costs and will safely tap and insert a corporation stop from ½" to 1"—and will ***tap only*** up to 2".

Used in connection with Mueller Corporation Stops with genuine Mueller Thread, it insures an absolutely perfect joint at the main.

Detailed descriptions and prices on request.

Mueller Co.,
Decatur, Ill., U. S. A.

Branches: 145-149 W. 30th St., New York City; 1072-76 Howard St., San Francisco; 2468 Hunter St., Los Angeles

When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

Improved Foam Fire Extinguisher

A distinct advance in the science of foam fire protection is marked in the announcement of the Foamite-Childs Corporation, Utica, N. Y., stating that a new 40-gallon portable foam chemical engine embodying the principles of the Foamite system has been developed. The change in design, as compared with the type of 40-gallon foam engine in use for the last few years, is important. While the new engine has substantially the same outward appearance as the old, the internal construction has been entirely redesigned, resulting in materially increasing the efficiency of the engine.

The volume of Firefoam generated by this new metered type engine is almost double the quantity delivered by the old type engines from the same quantity of chemical solution. In addition, the quality of the foam produced throughout the entire discharge period of the new engine is superior to that of the old. In the old type of foam chemical engine there are two containers, the outer shell or tank and the inner tube. The solutions are held in these two containers and prevented from premature mixing by a stopple which seals the inner tube. When the engine is operated, the entire volume of the two chemical solutions is almost instantaneously mixed by being simply thrown together. The result is an immediate high pressure, which rapidly decreases during the period of effective discharge. The entire quantity of foam is generated almost at once, and the period of effective discharge is materially shortened, because of the breaking down of the foam in the machine and hose.

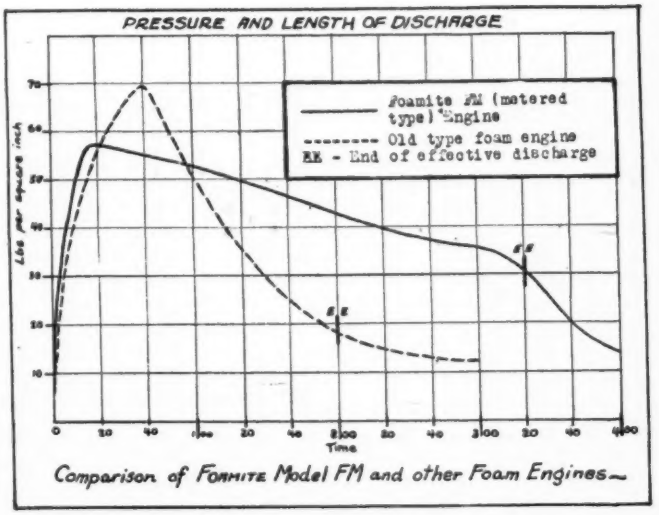

PRESSURE AND LENGTH OF DISCHARGE
Foamite FM (metered type) Engine
Old type foam engine
EE - End of effective discharge
Lbs per square inch
Time
Comparison of Foamite Model FM and other Foam Engines

DIAGRAM SHOWING COMPARATIVE PRESSURES AND LENGTH OF DISCHARGE OF THE NEW FOAMITE MODEL FM ENGINE AND OLD TYPE FOAM ENGINES

THE NEW MODEL OF METERED FOAM ENGINE

In the new metered type engine a medium pressure is generated at the start, which gradually decreases during the entire period of effective discharge, as shown on the accompanying comparative diagram. This moderate pressure is sufficient to provide an effective range during the entire discharge period. Another important feature of the metered type engine is the increased period of effective discharge. This is made possible by the fact that the foam does not break down in the machine and that the foam is discharged in a steady stream, rather than with a great gush at the beginning of discharge, followed by the rapid fall in pressure typical of the old type. As in the Foamite system, for the protection of oil tanks, the "A" and "B" solutions in this portable engine are stored in two separate tanks within the engine shell. A system of baffles, orifices and pressure-equalizing tubes has been arranged to measure the flow of the two solutions to the mixing chamber at the head of the engine shell, where they combine to form Firefoam. This high-quality foam is forced through the hose as soon as it is generated, in a swift stream of fire-smother gas-filled bubbles.

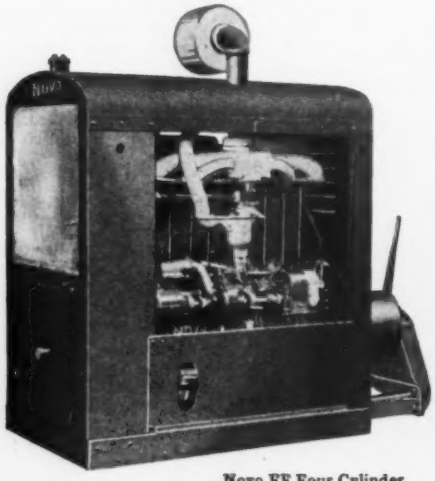
In addition to the extensive tests made by the manufacturer, the new metered type engine was submitted to the Underwriters' Laboratories, where rigid inspections and tests were imposed on the device. The Underwriters' Laboratories have approved the device as effective on both Class A and Class B fires, winning for the new engine the distinction of being the first 40-gallon foam engine to bear the Underwriters' label.

Novo Industrial Engines

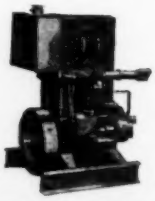
For City Work

Novo Single Cylinder Engine 1½-10 H. P. Hopper Cooled, Guaranteed Frost proof.

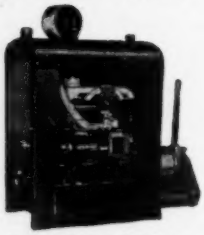
Novo YF Two Cylinder Engine 9-12 H.P. Radiator Cooled



Novo EF Four Cylinder Engine 25-40 H.P. Radiator Cooled



Novo RF Two Cylinder Engine 6-9 H.P. Hopper or Radiator Cooled



Novo AF and NF Four Cylinder Engine 12-24 H.P. Radiator Cooled

YOU will not be disappointed in expecting outstanding superiority in this complete line of Novo Industrial Engines. We have built into them those characteristics which make them do your work as you want it done.

Back of Novo Industrial Engines is a tremendous factory, with unsurpassed engineering and manufacturing facilities. Behind them is the experience of seventeen years devoted to the building of fine engines.

These are a few of the many very good reasons why Novo is chosen in preference to all others.

Novo Industrial Engines are complete power plants in every respect. They are easy to operate, economical, powerful and reliable.

Novo Engines can be used at such a great number of tasks as to make them practically indispensable as a part of every power user's equipment.

Novo Service is worldwide. We can supply parts for the first Novo Engine made in 1908, and for every Novo Engine made since that time.

NOVO ENGINE CO.
Clarence E. Bement, Vice-Pres. & Gen. Mgr.
LANSING — MICHIGAN
Cable Address "NOVO LANSING"
Distributors Throughout the World

NOVO POWER
Keeps Operations Moving

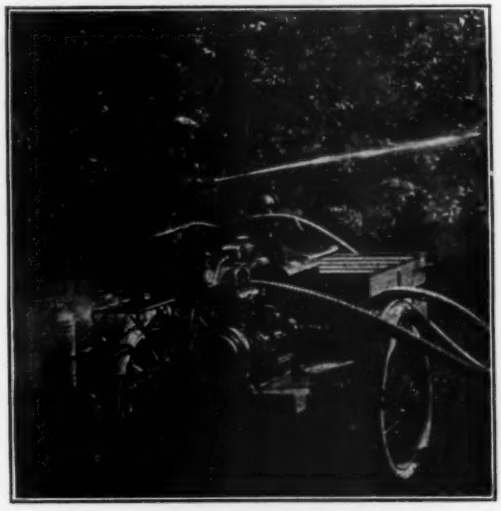
New Warning Signal Cannot Rust

The new Type K Essco warning signal, illustrated herewith, is constructed entirely of aluminum and copper. The striking panels are supplied with red, amber or green glass, with legends suitable to the location. The signal is so constructed that either or both of the panels flash, thus increasing the attention-getting qualities of the warning. This signal may also be equipped with an 8-inch gong, operating at the same time as the flash, if desired. The sign proper, which can be seen plainly in the brightest sunlight and is painted a brilliant yellow, weighs only 50 pounds when crated without the post, and measures 22½ inches high, 15 inches deep, and 9½ inches wide. This signal is made by the Essco Manufacturing Company, 110 Harrison Street, Peoria, Ill.

A NEW TRAFFIC WARNING SIGNAL

New Fire Fighter for Rough Country

Probably the most difficult fires to combat are those located in places not accessible to ordinary fire-fighting equipment, and particularly forest fires. An interesting piece of apparatus for this work has been developed by a Los Angeles mechanic, Jack Fletcher, in cooperation with the Evinrude Motor Company, Milwaukee, Wis. The equipment consists of a regular stock model 1924 74-inch motor Harley-Davidson motor-cycle with side-car chassis. The side-car body is removed and a substantial board platform mounted on the side-car springs. The platform is approximately as long as the side-car body and about the same width. A pump with over-all dimensions of 31 x 11½ x 17 inches is mounted on this platform, as well as two large-size hand extinguishers, an axe, and a couple of shovels. The pump is bolted to the platform lengthwise, the fly-wheel being at the rear so as to be easily accessible in starting the motor. The suction hose, 2½ inches in size, is coiled around the engine and rests on wrought-iron hooks provided for the purpose, and 200 feet of 2-inch hose is carried in the hose-rack, which is provided with a drop-gate at the forward end, so that the hose can be withdrawn without a moment's delay.



SPEEDY, COMPACT FIRE-FIGHTING UNIT FOR CITY OR COUNTRY

The pump alone weighs about 105 pounds, and the rack, extinguishers, hose, shovels, etc., bring the total weight to 190 pounds. This piece of apparatus, while particularly advantageous in bad localities where heavy apparatus cannot be used, would also make a very handy auxiliary unit in small towns and cities, where it can reach the fire much quicker than the ordinary pumper and render fine service in checking fires which have already secured some headway. The 4½-horse-power Evinrude motor, with its attached pump, can throw a stream 80 feet high, or 1,500 gallons per hour against a head of 277 feet, which is the friction of 1.3 miles of 1.5-inch pipe.

New Osgood District Sales Manager

The Osgood Company, Marion, Ohio, has announced the appointment of C. J. Thompson as District Sales Manager in charge of the New York District with offices at 50 Church Street, New York City. Mr. Thompson has had wide experience in the excavating machinery and contracting field and is well qualified to look after the interests of users of excavating machinery.

Use of the Geophone in Detecting Water Waste

The Geophone has become an almost indispensable piece of equipment with water-works men, as it enables the department to readily and economically locate leaks in mains, even when they are out of sight under city pavements.

The best way to learn to use this instrument, according to D. R. Taylor, Assistant Superintendent, Roanoke Water Works Company, Roanoke, Va., is, first, to open a spigot in the office or house to full flow and place the Geophone on the plumbing in another room, if possible, to determine the particular sound of this flow. Then the spigot should be shut off a half-turn at a time, the operator listening each time with the Geophone to determine the sounds for each different flow, until the spigot is open only wide enough to give the slightest sound with the Geophone. The same procedure is repeated, closing the spigot gradually, but this time the operator listens at the meter in front of the building on the sidewalk under which the service runs and along the wall through which the service enters the building.

After an operator has learned to recognize the sound of running water in pipes, he can proceed to a section where a leak is supposed to be, and take soundings on the surface along the approximate line of the main about every ten feet until the noise of a leak is distinguished. Then he should proceed slowly, taking soundings every two feet, listening carefully at each sounding and noticing whether the noise grows louder, until a

See Us At the Road Show

Booths 33, 34, 44, 45, Ball Room

Vibrolithic is not a material. *It is a mechanical process.* Vibrating machines, transmitting 1,500 impulses per minute, impress a coating of hard rock, cubical shaped with flat faces uppermost, into plastic concrete, *right at the plane of wear.* These rock particles displace entrapped air and excess water without increasing volume, resulting in thorough compaction of the concrete—*all in the same operation.*

While at the Road Show, let us explain the Vibrolithic Method. See this perfected concrete pavement on Sheridan Road in Lincoln Park—as good as new after carrying 40,000 vehicles daily for a year.

83 Cities

Used our Vibrolithic Method of perfecting concrete pavement during 1924, in 16 states as follows:

Arkansas	Mississippi
Colorado	Missouri
Illinois	Nebraska
Indiana	New Jersey
Iowa	South Dakota
Kansas	Oklahoma
Michigan	Washington
Minnesota	Wisconsin

Portland Cement Concrete Pavement

"Armorplated" by

THE Vibrolithic METHOD

Vibrolithic superiority is recognized in its acceptance on road and street projects in sixteen states and eighty-three cities. Reorders have come from practically every town where Vibrolithic has been used.

The Vibrolithic Method produces extreme density of concrete (high volume of coarse aggregate and less mortar) and higher beam strength of slab, consequently greater resistance to contraction, expansion and impact, reducing cracking and surface wear.

Vibrolithic does not introduce new material, delay the work or make costly demands on the contractor.

Write for our moving picture Booklet A, showing progressive steps in The Vibrolithic Method

Vibrolithic Concrete Pavement on Sheridan Road, Lincoln Park, Chicago.

American Vibrolithic Corporation

INSURANCE EXCHANGE BUILDING DES MOINES, IOWA

SALES OFFICES IN 16 OTHER CITIES

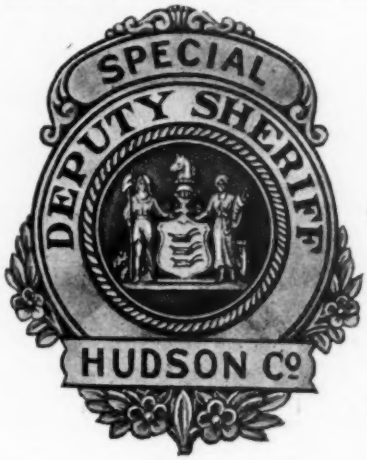
GEOPHONE IN CARRYING CASE

point is reached where the noise begins to grow fainter as the operator proceeds. Then, by criss-crossing, it is possible to locate the leak definitely in a very small section, thus minimizing the size of hole necessary to dig to stop the leak.

The complete equipment, which is furnished by the Empire Electric & Water Company, Inc., 452 Lexington Avenue, New York City, consists of a pair of Geophones with connecting tubes and ear-pieces, complete in a stout carrying case.

High-Grade Official Badges

An organization which has been producing municipal badges for 46 years, and of such quality that municipalities constantly send in new orders, has a record of which it may be proud. The C. G. Braxmar Company, Inc., 10-12 Maiden Lane, New York, has been serving municipalities in this capacity since 1879. In this time they have accumulated an unusually large number of steel dies from which the badges are made. At present there are



ONE OF THE 7,000 STYLES OF BADGES

over 7,000 of these dies in stock, and only recently an order was received from an out-of-town customer for badges, the die for which was made by the company 31 years ago. Braxmar badges are made of 18 per cent nickel, which makes a very hard badge, increasing the manufacturing cost, but gives a badge which is much more satisfactory and is appreciated by officials wearing them.

The badges are first "blanked out." This is done by placing the nickel metal upon the die under a hammer which strikes a blow of 30,000 pounds. It is sometimes necessary to give three to five blows in order to bring out the detail of the badge. Between blows the metal has to be annealed. After the blank is struck up, the lettering is stamped in by hand, the joint pin and catch are soldered on, and then the badge is sent to the nickel-plating department. After this the lettering is filled in with the different colored enamels desired, and it then goes to the Inspection Department. It is seen that a badge which sells for about a dollar goes through a number of detailed processes. Several of the men who are employed in this work have been with the Braxmar Company for over 35 years and take particular pride in their work.

A Keyed Asphalt and Concrete Paving Block

The Keystablock, which is a monolithic asphalt concrete paving block having a bitumen percentage of 12 per cent with a penetration at 77 degrees up to 110 and a mineral aggregate of balanced composition to meet traffic requirements, has been placed on the market by the Keystabond Asphalt Paving Company, Inc., 367 Boylston Street, Boston, Mass. The standard block measures 3½ x 4 x 12 inches.

These blocks obtain their lateral strength from an undercourse of concrete securely keyed or bonded to the asphalt wearing course. They are made by forcing the asphaltic material into this bond by hydraulic pressure. In this way, the asphalt surface course cannot creep or wave under traffic or climatic changes.

The keystones are about one inch in diameter and are coated with bitumen. The top surface is pressed into this, and the remaining half of the voids filled with concrete. These blocks can be manufactured anywhere where the required grade of sand or crusher screenings may be secured. This makes it possible for a contractor or a city having an asphalt plant to operate twelve months a year, reducing the overhead caused by the usual five or six months' shutdown.

The Keystablock asphalt paving block can be laid by any paver, as it is uniform in size and is laid the same as brick or wood block on concrete, macadam or sand and gravel foundations. The blocks can be made in various depths so that they can be used for patching wood block, brick or sheet asphalt paving at any season of the year. They are particularly adaptable for use with asphalt paving along street-car rails where neither concrete nor asphalt alone has been found satisfactory.

Van Dorn Gear-Driven Hoists

The Van Dorn "Average Duty" Underbody Hoist. For pay loads up to 7½ tons, a greater margin of safety allowance than the usual hoist rating.

The Van Dorn "Heavy Duty" Underbody Hoist. For pay loads up to 9 tons. Powerful and positive in action. The highest quality hoist obtainable.

"Brr-rr! I wish we had a Van Dorn Mechanical Hoist!"

FREEZING temperatures have no effect on Van Dorn Mechanical Hoists.

Van Dorn Mechanical Hoists, because they are gear driven, *cannot freeze* or *clog* in cold weather. Operating just as efficiently in winter as in summer Van Dorn *Mechanical* Hoists can be depended upon for *uninterrupted* dump truck service month after month and year after year.

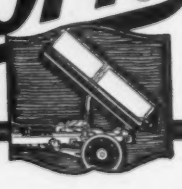
Regardless of whether you own one dump truck or a fleet of one hundred it will pay you to know the superior advantages of Van Dorn *Mechanical* Hoists.

Send for catalog, or better still, permit us to send one of our representatives. There is no obligation.

THE VAN DORN IRON WORKS CO., Cleveland, Ohio

Branches and Service Stations in Principal Cities

Van Dorn



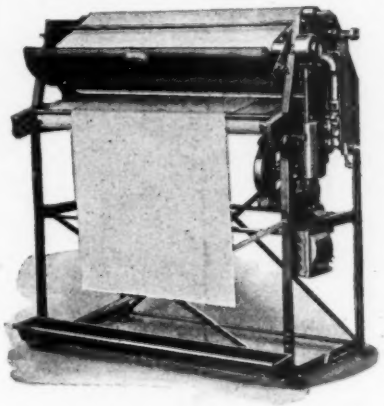
-MECHANICAL-
-DUMP TRUCK-
HOISTS & BODIES

When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

A Blue-Print Dryer

A blue-print dryer having a number of interesting features, and capable of drying 8 linear feet of dripping-wet prints in a minute without wrinkles, has been placed on the market by the C. F. Pease Company, 859 North Franklin Street, Chicago, Ill.

The traveling apron on which the wet prints are placed is slanted slightly downward, thus allowing all the surplus water to drop into the tray provided beneath the machine. This prevents the water from collecting where the cylinder and belt meet, and does away with one of the chief causes of the wrinkling of prints. Squeegeeing is unnecessary. Another feature is the patented thermostatic control which is used only on dryers heated with gas. All dryers are furnished with an asbestos apron which eliminates the difficulty



BLUE-PRINT DRYER IN ACTION

of scorched belts. The apron is run into the machine completely around the cylinder the moment the machine is stopped, and provides ample protection for the belt while the cylinder is cooling off.

The machine is equipped with a copper cylinder which heats up quickly and retains the heat, and to which the prints will not adhere; they peel off automatically without the use of a finger arrangement or any special attachment. The copper cylinder will not rust.

This machine is manufactured in two sizes, 22 inches and 45 inches. The 45-inch machines are provided with a gear which gives two ranges of speed, namely, 4 and 8 feet per minute, whereas the 22-inch machine has but one speed of 4 feet per minute. Cut gears are used throughout, and these gears are properly protected to meet factory inspection. Ball bearings are also used throughout. The machine is operated by a ⅛-horsepower motor.

New Branch Office Manager

The Fulton Iron Works Company, St. Louis, Mo., has announced the appointment of A. G. Wright as Manager of its branch office in Dallas, Texas. The Fulton-Diesel sales territory handled from Dallas includes the state of Oklahoma, as well as Texas.

A Composite Asphalt Storage, Heating and Pumping Outfit

The very general use of tank car asphalt has emphasized the importance of economical storage facilities for this material. A composite storage tank, heating and pumping outfit has been developed by Warren Brothers Company, 9 Cambridge Street, Boston, Mass.

The tank is built in two sizes with capacities of 25,000 gallons and 33,500 gallons respectively. The tanks are circular in shape, consisting of an outer shell built in segments which can be shipped knocked down and assembled at the job. There is provided a central heating compartment having a capacity of 2,380 gallons. The central heating chamber is equipped with three separate electric-welded steam coils constructed of extra heavy 1¼-inch pipe. These coils are of sufficient capacity to quickly heat the contents of this central chamber to the temperature necessary for its use in paving mixtures.

The outer portion or main storage compartment is equipped with steam pipes of a capacity to sufficiently liquefy the bulk of the asphalt to a point where it will readily flow beneath the lower end of the central heating chamber, where it comes into immediate contact with the heating coils. It is, however, necessary to heat the bulk storage only in cold weather. As the hot asphalt is pumped from the central heating chamber, it is constantly being renewed by the inflow from the outer chamber. This arrangement does away with the delay and fuel expense involved where ordinary cylindrical storage tanks are used.

It is impossible to start pumping from an ordinary cylindrical storage tank, such as has been quite generally employed, until the entire contents of the tank are thoroughly heated, and this usually necessitates keeping steam on these tanks from 18 to 24 hours, or longer in cold weather. When employing this composite storage tank, only a few hours are necessary to heat the material in the central storage tank to a temperature suitable for immediate use in the mixer or when special conditions necessitate pumping it over an intermediate plant melting-tank.

These tanks are furnished complete with piping for the outer chamber, circular coils for the inner heating chamber, a direct-connected pumping outfit, steam-heated suction lines from the central heating chamber to the pump, and steam-heated inflow lines from the pump to the central chamber. There is furnished with this outfit a galvanized-iron cover for the central heating chamber, and the shell of the heating chamber is equipped with a heavy angle-iron ring at the top for supporting wooden roof rafters. This entire outfit can be dismantled and removed at very slight expense, and where a paving contract or municipal job is of such size as to warrant storage facilities of any description a very pronounced economy results from the use of this type of storage tank. Not only from the view-point of economy as regards storage and heating, but under ordinary conditions, the use of such a tank makes it possible to entirely eliminate plant melting-tanks or kettles by the employment of the central heating chamber of the storage tank to furnish asphalt for the mixture, this asphalt being pumped direct to the weighing bucket.

This outfit is equipped with a Warren direct-connected asphalt pumping unit, which consists of

Open to Traffic in 10 Days!

Photo not retouched—just as it is, no hair cracks, a perfect surface cured by Solvay Calcium Chloride.

THE concrete on the road pictured above was placed October 5th and 6th and the road was opened to traffic on October 16th!

That shows a real saving of time not only for the contractor, who thus receives his money that much sooner, but for the Highway Engineer who thus is so much sooner enabled to turn to other work, and also there is a real service to the community, which is able to make use of the road so much sooner.

State and County Engineers, wherever Calcium Chloride curing has been used, are unanimous in their commendation. Results are certain with Solvay because it automatically proceeds with the curing. There is no worry concerning daily sprinkling, no expense for inspectors. Once Solvay is applied the curing goes ahead and you quickly have the road in use, a strong perfectly cured concrete highway.

Solvay may be obtained in drums containing 375 lbs. or in the moisture-proof, easy to handle 100-lb. bag, shipped from 75 conveniently located distributing points.

For CONCRETE CURING

use SOLVAY

Free Running

Calcium Chloride

The Solvay Method is cheaper, quicker, surer, more efficient than the old time covering methods. Let us prove it—write for booklet No. 1061 or send us details of your work and our engineers will give you the benefit of their experience without charge. Address

THE SOLVAY PROCESS CO.

WING & EVANS, Inc. ***Sales Department*** **40 RECTOR ST., NEW YORK**

a steam-jacketed pump, a steam-jacketed strainer and a high-grade 5 x 6-inch vertical engine having a speed range of from 200 r.p.m. to 550 r.p.m., equipped with automatic lubrication and a safety cut-off device. The entire outfit is mounted on a substantial cast iron base, the pump and engine shaft being connected with a flexible coupling. A 3-inch suction line is provided, the design of the pump being such that this may enter from either side. The discharge is also through a 3-inch pipe. As it is always necessary to heat the asphalt piping between the pump and the point of outlet, provision is made to do this by employing a 4-inch pipe jacket around the delivery line, or a ¾-inch steam line inside the 3-inch asphalt line. When employing the 4-inch steam pipe jacket, this 4-inch pipe is screwed into the threaded shoulder on the top side of the pump, and small steam ports are drilled between the 3-inch pipe thread and the 4-inch pipe thread, which permits the steam to circulate from the pump jacket into the pipe jacket. The steam-jacketed strainer is designed to take either a 3-inch inlet pipe with a 4-inch jacket or a 3-inch inlet pipe with a steam-heating line inside of it. A perforated bucket type strainer is employed and provision is made for cleaning the strainer by removing the plug in the top side of the strainer casing. This pump has a capacity to pump 100 gallons per minute at 200 r.p.m. and 160 gallons per minute at 300 r.p.m.

A One-Man Power Loader

City officials and contractors will be interested in the development of the Mandt loader, made by the Mandt Company, Keokuk, Ia. This machine is particularly adapted to the loading of sand, gravel, dirt or crushed stone and may be used to dig and level, as well as to load trucks from streets. It may also be used as a scraper, backfiller, wheel scraper, and for charging concrete mixers. Many cities have found the machine adaptable to snow removal and for loading up road repair materials.

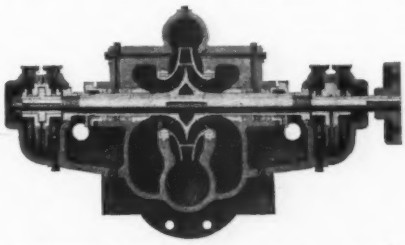
The loader is equipped with a ¼-yard tip-over bucket, measuring 40 inches wide by 22 inches deep. The bottom is of heavy steel plate. The shovel is filled by being pushed into the pile by the tractor and is raised by power. The ¼-yard bucket is used for handling dirt, sand, gravel, coal or crushed stone. It has been found that the machine will load sand at the rate of about one yard a minute, or crushed stone at the rate of one yard in three to four minutes, depending upon the operator. Thirteen seconds is the average time required to dig a load, raise the shovel and swing and dump for 20 loads on one job.

This equipment is attached to the Fordson tractor without drilling a hole. It merely clamps on and can be assembled by two men in a couple of hours. The loader is built of steel for heavy work, using structural steel with heavy gussets, swinging brackets, and also on the main supporting yoke. The pulleys are bronze bushed, the clutches are of the Havana toggle type, easily adjusted, and the gears to the power take-off are steel machine cut. The outfit may be shifted to a ½-yard shovel or equipped with a gooseneck. Steel castings are used on the top and bottom crane attachment by the removal of two stud bolts.

Improvements in Centrifugal Pumps

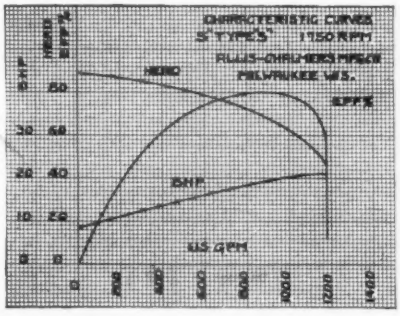
The Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has announced that it has added a new low-head pump, Type S, built in smaller sizes but similar to the standard pumps of this type. This new pump has a number of mechanical improvements incorporated in its construction which give higher efficiency, due to the elimination of a number of hydraulic losses.

Among the improvements are new L-shaped bronze companion wearing rings which reduce disturbances in the suction passages and increase



SECTIONAL VIEW OF NEW LOW-HEAD PUMP

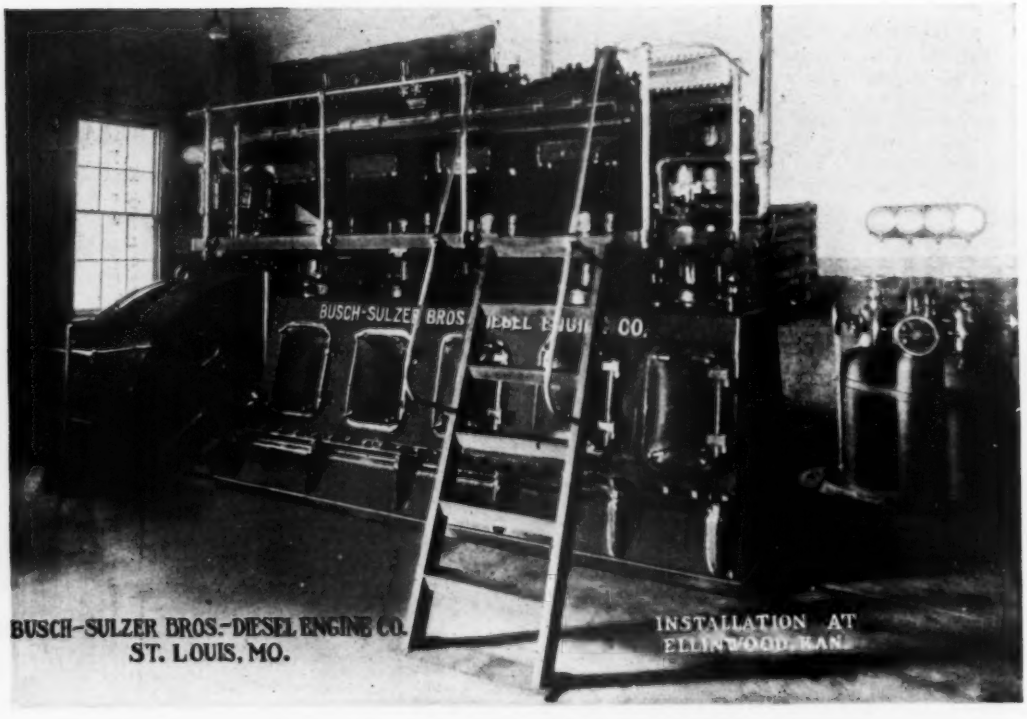
the efficiency. The split bronze enclosed glands are drained to prevent water from being thrown off or entering the bearing. The stuffing-box throat is provided with bronze bushings, and the annealed steel shaft has removable cast bronze sleeves extending from the runner hub to the inside of the bearing house. A double-acting center collar thrust bearing on the outboard end is firmly fixed and locked in place so that it will not become loose. The split bearing shells have two oil rings, and oil is led to the center of the bearing, keeping it away from the end and affording a circulation. The pump has self-closing oil hole



EFFICIENCY CURVES OF TYPE S PUMP

covers with dust covers at the ends and oil-level indicating cups on the side of the bearings.

The water-seal passages are integral in the upper half casing, and can be arranged for outside seal when necessary. The shaft nuts are designed to act as oil throwers to keep the oil in the bearings, and the shaft sleeves are designed to prevent any water which might creep along the shaft from entering the bearings. The accompanying diagram shows the performance of one of the new 5-inch pumps: for 900 gallons against 68 feet head, an efficiency of 80 per cent is obtained, and the efficiency is above 70 per cent from 520 to 1,120 gallons per minute discharge.

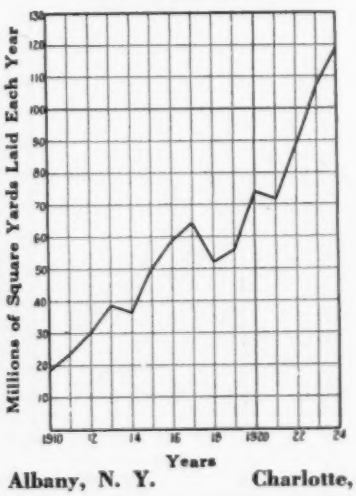


ASPHALT PAVED AMERICA

Nearly Nine Hundred Million Square Yards Have Been Laid On the Roads and Streets of America in Last Fifteen Years

1924, With Approximately 118,800,000 Square Yards, Breaks All Records

"Follow the Black Line" for the Ideal Pavement



East and West the asphalt pavement is leading the way to auto comfort. On the Pacific Coast 72 per cent of paving contracts let during 1924 were for asphalt while on the Atlantic Coast, Massachusetts reports 68.6 per cent asphalt on 1924 state road contracts.

ASPHALT—PROVED THROUGH THE AGES

Write for Complete Information

The Asphalt Association

25 W. Forty-third St.

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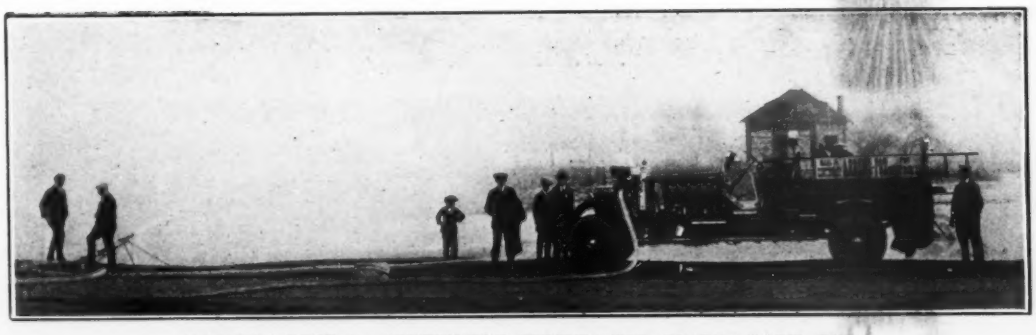


OFFICIAL TEST OF AHRENS-FOX PUMPER FOR FOREST PARK, ILL.

New Pumpers Pass Acceptance Tests

A 1,000-gallon auto pumping engine, made by the Ahrens-Fox Fire Engine Company, Cincinnati, Ohio, recently passed the official Underwriters test for delivery to Forest Park, Ill. This engine pumped 1,033 gallons per minute against 131 pounds pressure with a lift of approximately 9 feet.

A new Ahrens-Fox 750-gallon pumper, delivered to No. 3 Fire Company, Madison, Ind., a short time ago, successfully passed the three-hour test of the Indiana Board of Underwriters for sustained pumping efficiency. The requirements included a two hours' run at a pressure of 120 pounds, a 30-minute run delivering 375 gallons per minute against a pressure of 275 pounds, and a 30-minute run delivering 300 gallons per minute against 250 pounds pressure.

The city of Durham, N. C., recently awarded the contract for a new 750-gallon auto pumping engine to the Ahrens-Fox Fire Engine Company.

A New Flexible Mower

The Model L combination motor lawn-mower and roller which has been developed by the Coldwell Lawn Mower Company, Newburgh, N. Y., has many features which will interest municipal park and golf course officials. The machine is powered with a Fuller & Johnson 3½-horsepower, 4-cycle, water-cooled motor with radiator and fan. The cutter knives and full-width traction roller are each independently driven direct from the motor, and each has its separate clutch and control lever. The full floating cutter front conforms readily to the uneven surface of the ground. The motor and all working parts are protected from flying grass and dirt, and the gears are enclosed and run in oil.

This machine makes it possible to handle mowing and rolling simultaneously. The mower cuts a swath 25 inches wide, which may be increased easily to 60 inches by attaching two gang units. It is so easy to operate that, as shown in the illustration, it can be run around flower-beds readily, leaving no trimming for hand mowers. The couplings are flexible, so that the individual mowers readily follow the contour of the ground, cutting both sloping and level ground at the same time.

MOTOR MOWER WITH TWO GANG MOWERS OPERATING AROUND BEDS OF SHRUBBERY

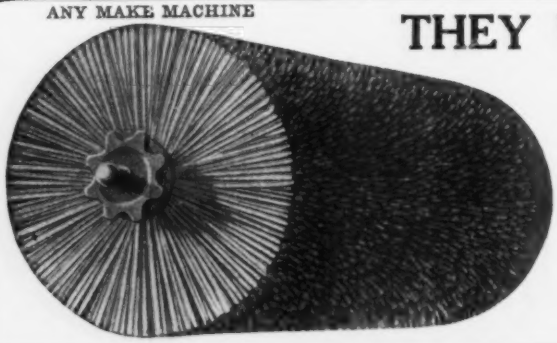
John M. Egan Joins Brick Association

The Illinois Paving Brick Manufacturers' Association has announced that it has engaged John M. Egan, Jr., of Aurora, Ill., as chief engineer because of its steadily expanding business. Mr. Egan will cooperate in a consulting capacity with engineers, public officials and the public in general in order to promote the proper design and construction of brick pavements as dicated by the most modern developments. Mr. Egan's headquarters will be with the Illinois Association at Springfield, Ill.

New Police Call-Board in New Bedford

The growth of the city of New Bedford, Mass., and the increased number of patrol calls have made it necessary to install a new police desk in the Weld Street Station in the North End. This board, supplied by the Gamewell Company, Newton Upper Falls, Mass., is connected through an intercommunicating panel with the Central Police Station. The new board will take care of all incoming calls, but outgoing calls will still be handled by the Central Office.

ANY MAKE MACHINE



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WHEN THEY DO

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To Be Refilled.

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"POMONA" Double Stroke Deep Well Power Pump

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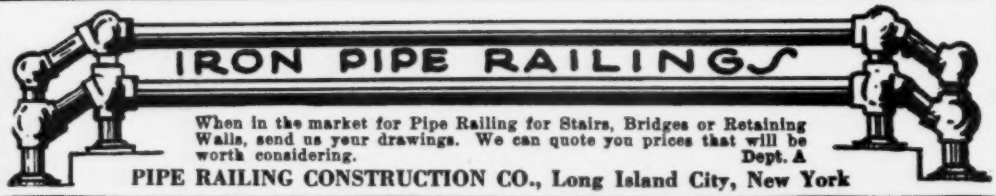

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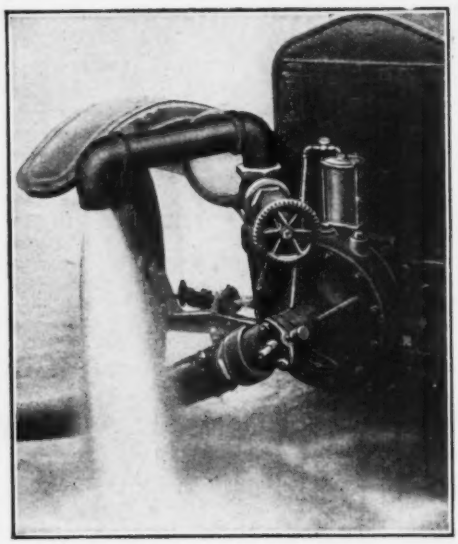
PIPE RAILING CONSTRUCTION CO., Long Island City, New York



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with the automatic primer using the power your motor car affords

Is the most practical pumping equipment on the market. Used and approved by contractors, Engineers and public works Depts. Write for Bulletin No. 56.

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BATTLE CREEK, MICHIGAN

BUTLER IMPROVED STREET CANS

are sanitary, artistic and serviceable.
The refuse thrown into the Butler trash can is out of sight. Once in, it stays in until taken out.

Write for latest literature.

The Butler Mfg. Co.
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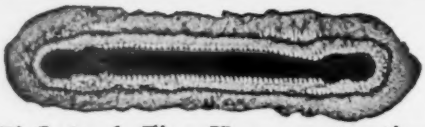

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Bi-Lateral Fire Hose Co.

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